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DIESEL and GAS ENGINE PROGRESS

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AUGUST CONTENTS

FRONT COVER ILLUSTRATION: The Alfred I. duPont Building, Miami, Florida. See the four-year operating record of the duPont Building Diesel generating plant in this issue.

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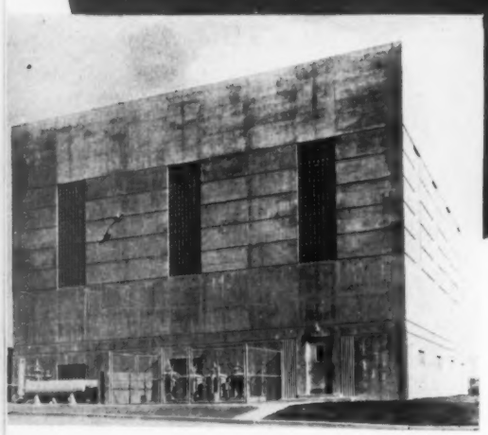
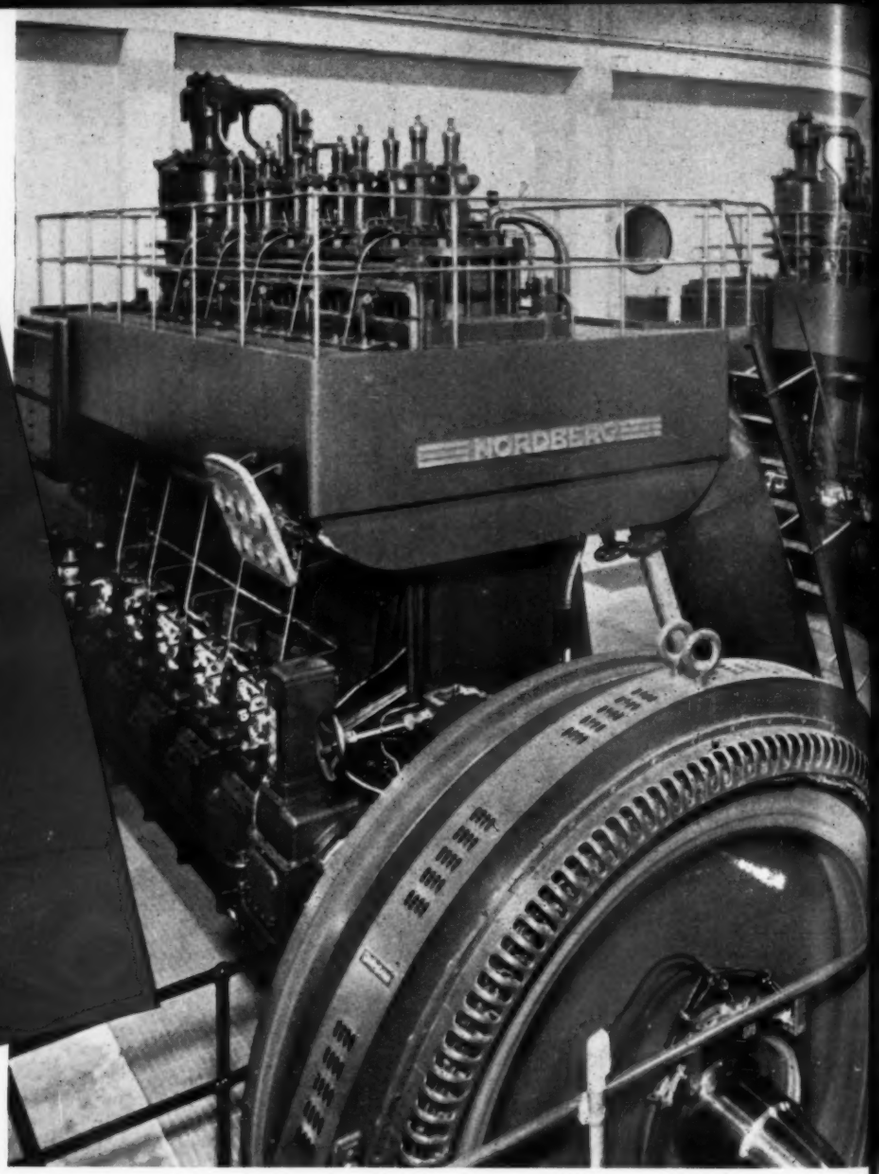
CEMENT PLANT USES GAS DIESELS FOR HEAVY LOADS

by C. A. WALLERSTEDT*





Left and above: Exterior and engine room views of the Universal Atlas Cement Company gas-Diesel power plant at Waco, Texas. Right: Operating end of the engine. Note Woodward governor and Manzel lubricator.

IN the summer of 1940 the Universal Atlas Cement Company deemed it advisable to build a plant to generate the power necessary to operate its cement plant at Waco, Texas. In deciding upon the kind and type of equipment necessary to fulfill satisfactorily and efficiently the power requirements of the manufacturing process, it was necessary to consider the following factors:

1. The cement plant was using natural gas in its burning operations. The supply was dependable and ample. The price of the gas on a BTU basis was considerably lower than that of any other available fuel. The gas was clean and fairly uniform in its heat value of about 1000 to 1100 BTU's per cubic foot. It was deemed advisable that prime movers be able to operate on either gas or heavy fuel oil.

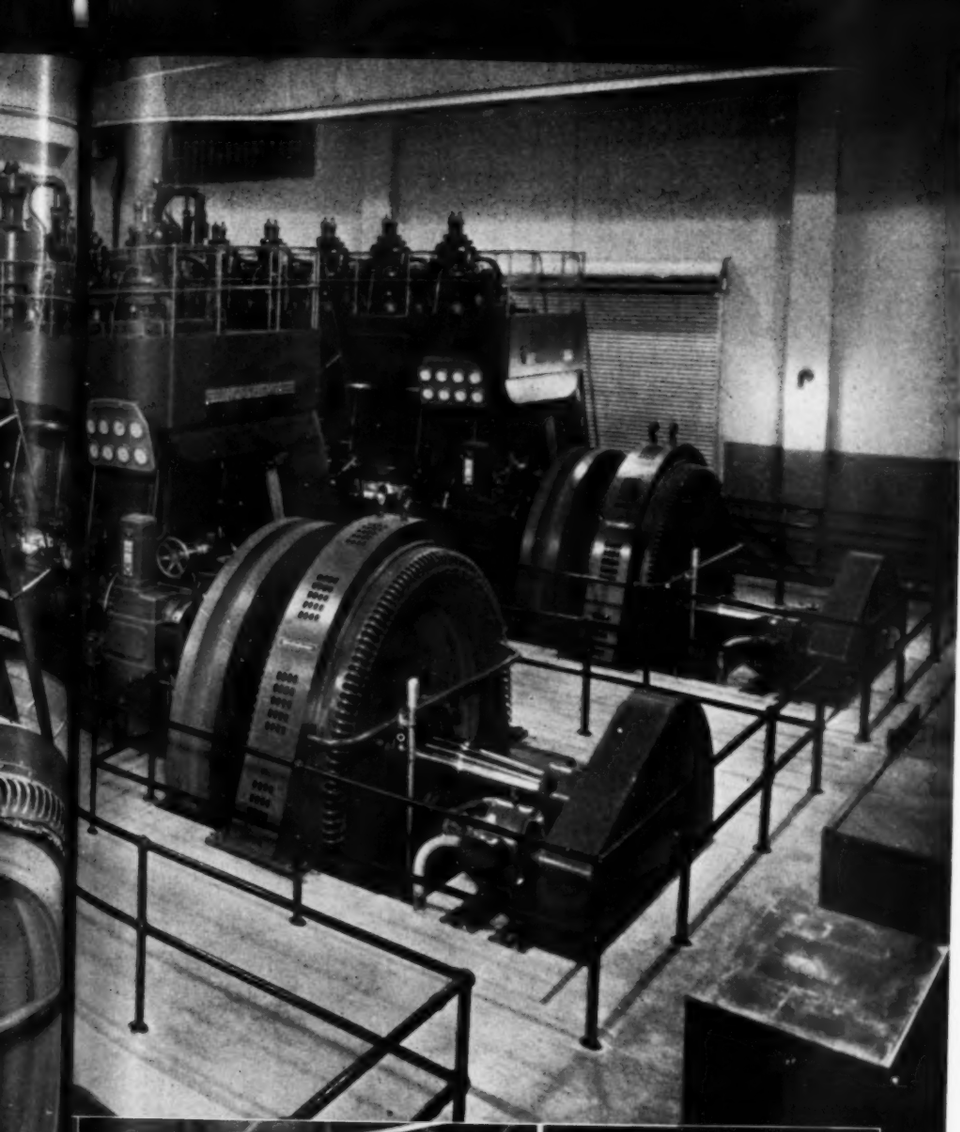
2. The average 24-hour load of the plant was about 2400 kw. seven days per week. Peak loads were about 3200 kw. The total connected load was about 5000 hp., made up of motors ranging from 1 hp. to 1000 hp. each.

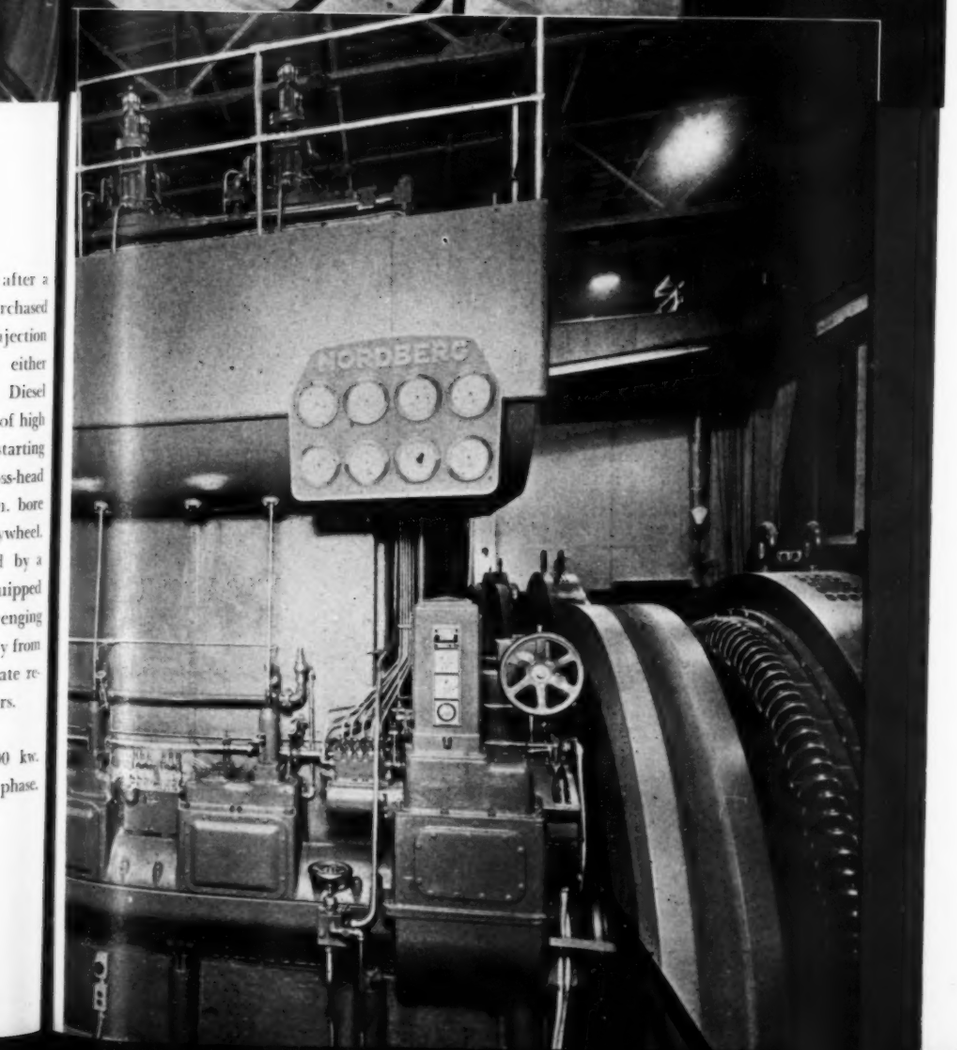
3. Due to the fact that the 1000-hp. motor was direct connected to its load and arranged for across the line starting, the power plant had to have sufficient overload capacity and sufficiently sensitive governors to start this 1000-hp. motor under load and also to suddenly drop this load without unduly raising or lowering the voltage or the speed of the prime movers and thereby the cycles of the electric current generated. The inrush of power required to start this motor is estimated at 3000 hp.

To meet these operating conditions, the Engineering Department of our company, after a thorough investigation of all factors, purchased three identical 2000-hp. Diesel air injection engines, each capable of operating on either natural gas or heavy fuel oil on a full Diesel cycle and direct connected to generators of high WR^2 rating to take care of the heavy starting duty. Each engine is 2-cycle of the cross-head type having five power cylinders 21½-in. bore by 29-in. stroke, has a 57,000-pound flywheel, operates at 225 rpm. and is controlled by a hydraulic governor. Each engine is equipped with a three-stage compressor and a scavenging cylinder, both of which are driven directly from the crankshaft of the engine. To facilitate repairs, all engines have barring-over motors.

The capacity of each generator is 1500 kw. (1875 kva. at .80 pf.) and generates 3 phase,

* Plant Manager, Universal Atlas Cement Company, Waco, Texas.





60-cycle electric current at 2500 volts and designed for 20% voltage regulation. Each generator has its own oversized exciter, driven by a V belt from the generator shaft extension. The switchboard and instrument panel are equipped with an automatic voltage regulator. This latter feaure is particularly desirable when starting or stopping one of the large motors.

The main operating control board of the plant consists of a five-panel metalclad switchboard, including a swinging panel. There is one panel for each generating unit, one main feeder and one transformer bank panel. Each panel is built so that its circuit breaker can be removed from the front of the switchgear without interfering with the equipment on the front panels.

A six-panel withdrawal type switchboard is installed for controlling the 3-phase, 440-volt motors driving the station auxiliaries. The 440-volt current delivered to this switchboard is received from a bank of three 75-kva. 2300/440 bank of transformers. Adjoining this bank of transformers, in the same enclosure, is a 37½-kva., 2300/220-110 volt transformer for station lights and other 110-volt equipment. These transformers receive 2300-volt current from the transformer panel of the main switchboard.

The building, consisting of basement and main operating floor, which houses the equipment, is monolithic concrete construction 86 ft. 6 in. long by 66 ft. 6 in. wide with glass brick windows. The basement walls are 12 inches thick and the walls above the main floor are 9 inches thick. The distance from the basement floor to the main operating floor is 13 ft. 6 in. and the height of the main room from the operating floor to the bottom chords of the roof trusses is 28 ft. 6 in. The roof is constructed of precast concrete slabs and covered with roofing felt and roofing compound. Motor-driven fan-type roof ventilators are installed to carry away the heat generated by the engines and generators. Fresh air is supplied to the building by a 40,000-cubic-feet-per-minute fan driven by a V belt connected to a 20-hp. motor which draws air through a set of viscous-impingement filter elements and delivers the filtered air through a duct system to various parts of the basement. From the basement the fresh air travels up through grating built around each engine and thence up through the roof ventilators.

For use in installing the heavy equipment and facilitating repairs, a 10-ton hand-operated crane was installed. This crane spans the entire width and travels the whole length of the building so that any piece of equipment in the plant

can be handled by it, including the heat exchangers in the basement when the grating is removed.

A cooling tower, constructed of Washington red wood, brass bolts and copper nails, was installed about two hundred feet away from the building at such an elevation that the water level in the basin of the cooling tower is a few feet higher than the main engine room floor so as to always provide a positive head of water on the suction side of the raw-water pumps. The cooling tower is equipped with a geared motor-driven forced-draft fan with a variable pitch propeller. The cooling tower and the power station are connected with a twelve-inch transite pipe for carrying cool water to the station and ten-inch transite pipe for delivering hot water back to the top of the cooling tower. A float valve is installed in the cooling tower basin to add make-up water as needed, keeping a constant level of water in the basin. The variable pitch propeller permits an increase in the summer and decrease during the winter months of the amount of air forced through the cooling tower.

In a single row on the main floor of the engine room are six identical 500-gpm. centrifugal pumps, each direct connected to a 1750-rpm. squirrel cage motor. Three of these pumps are for the raw-water system and three for the closed soft-water system. The raw-water pumps receive water from a common header in the basement, which in turn receives cooled water from the cooling tower. The three raw-water units pump water through oil coolers and heat exchangers and back to the top of the cooling tower.

The 22-inch diameter exhaust pipes from the engines are insulated and run through the basement to silencers set on concrete foundations just back of the building. Stacks from the silencers extend to a few feet above the roof of the building.

At the present time the engines are operating on natural gas and have been so operated since their installation. Natural gas is received at the Gas-Metering House at about 250 pounds pressure, where the pressure is reduced in several stages to about 20 pounds for the cement plant's general use. At one of the intermediate stages, gas at 60 pounds pressure is drawn off, metered and delivered to the Diesel Power Station. Before the gas enters the power station building, it passes through a gas scrubber to remove any sand or other foreign material that might be present and thence through a pressure regulator that reduces the pressure to 10 pounds, at which pressure it is delivered to the six-inch header running the length of the power station basement. From this header a three-inch lateral is run to each engine. In each of these laterals is placed a plate orifice and a pair of orifice flanges. From each set of these flanges, ½-inch pipes with valves are connected to a combined recording and integrating meter. By the use of these valves, this one meter can be used at will to integrate and record the gas used by any one of the three units. This makes it a very simple matter to test any one of the three units as often as desired.

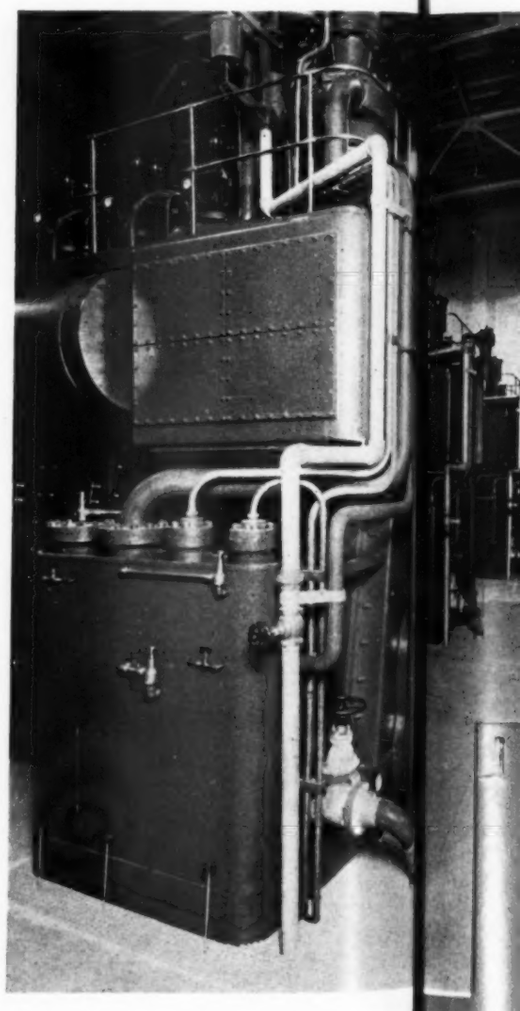
The compressor on each engine compresses gas through three stages to 1200 psi., at which pressure, together with a small amount of pilot oil to start and stabilize combustion, it is injected into the cylinder. At ¾ load the pilot oil on a BTU basis constitutes only about 4% of the total fuel consumption. If, however, at some future time it be deemed advisable to change from gas to fuel oil, a few simple changes can be made on each engine so that the compressor would compress air to about 1100 pounds per square inch and this air used to atomize and inject heavy fuel oil into the cylinders.

Air for starting the engines is furnished by a motor-driven compressor and is stored in three 50-cubic-foot tanks at 350 pounds pressure. When an engine is to be started, the air is delivered to the engines through seamless steel tubing to the starting valve. On account of the extra heavy flywheels, all five power cylinders are used for starting.

Another motor-driven gas compressor is used for compressing gas to 1200 psi. for initial starting and for starting after an extended shutdown period. In an emergency this gas compressor could be connected to the compressed air system to furnish 350-pound starting air. Built into each engine is a direct-connected lubricating oil pump which furnishes forced-feed lubrication to crankshaft bearings, for cooling the pistons and lubricating other parts of the engine. An auxiliary motor-driven pump is also installed for each engine. This auxiliary pump automatically starts to function in case the oil pressure from the regular pump should fail. Whenever an engine is stopped, this pump is kept running for 15 or 20 minutes to gradually cool the engine.

One of the most important steps in designing a power plant is to provide instruments by which the operators are enabled to observe whether or not the generating units are performing properly and efficiently and also to have automatic controls at points where failure could cause severe damage. The installation described in this article is amply provided with such instruments and controls.

A thermo-couple is placed in the exhaust gases of each cylinder. The wires from these thermo-couples lead to a five-point switch, one for each engine, mounted on an instrument panel. The operator can observe the temperature of the exhaust gases leaving any cylinder by simply turning the knob of the switch to the proper point. On this same instrument panel are mounted three vibrating horns, each horn having three lights—a red, a white and a blue. If the lubricating oil pressure should fail, the horn sounds a warning and the red light



Above: Intake end of the gas-Diesels. Right: Cross section of the engine showing the flow of gas and pilot oil and the hydraulic circuit for control of fuel-valves.

goes out. At the same time the motor-driven auxiliary oil pump automatically starts pumping oil, so that the safety of the engine is insured while the operator, who has been warned, can locate and correct the trouble. Similarly, if the soft-water pressure should fail, the signal sounds and the blue light goes out and in case of failure of the raw-water pressure, the alarm sounds and the white light goes out. There is one horn and one set of lights for each engine.

In addition to the above mentioned signals, a thermometer is installed in the oil-outlet connection from each oiled-cooled piston, one each at the oil inlet and outlet to the oil cooler as well as one each at the inlet and outlet of both the raw and soft water coolers. With these instruments, the operators have no difficulty in keeping all cylinders of all the engines functioning properly and efficiently at all times. On the instrument panel on which the warning signals are mounted are also mounted a master spring wound clock and a telechron clock. By keeping the time shown on the telechron clock the same as the master clock, the cycles are kept uniform throughout the day so that the numerous telechron clocks in the plant always show correct time.

For keeping the crank case and cooling oil in good operating condition, an oil filter was installed in the basement of the power station and is so connected that the oil can be purified continuously from any one of the three engines and returned while the engine is in operation or the entire batch of crank-case oil from any engine can be drawn off into a dirty oil tank, purified and pumped into the clean oil tank or back to the crank case. By this arrangement the oil can always be kept in good condition and if, during an engine shutdown period or any other time, it is deemed desirable, all the oil can be withdrawn from the crank case of any engine, purified and delivered back to the engine. The plant has now been in operation for more than eighteen months and the original oil charge, with only a slight amount of make up, is still in use and in good condition.

A 20,000-gallon tank for fuel-oil storage and a 10,000-gallon two-compartment tank for lubricating oil are located a few feet back of the silencers. One compartment (3333-gallon capacity) of this latter tank is for crank-case oil and the other compartment (6666-gallon capacity) is for cylinder oil. Fuel oil (pilot oil) of 28 to 32 degrees gravity is received in either tank cars or tank trucks and pumped to the fuel-oil tank. From the fuel-oil tank the oil is delivered by a gear pump to the day tanks in the power station as required. Lubricating oil is received in tank cars and trucked to the 10,000-gallon tank about once a year. The crank-case oil compartment is connected to a pump in the basement so that the crank case of any engine can be filled direct from the tank. The cylinder-oil compartment is piped to an oil dispensing unit in the basement of the power house. This arrangement eliminates all necessity for handling lubricating oil barrels.

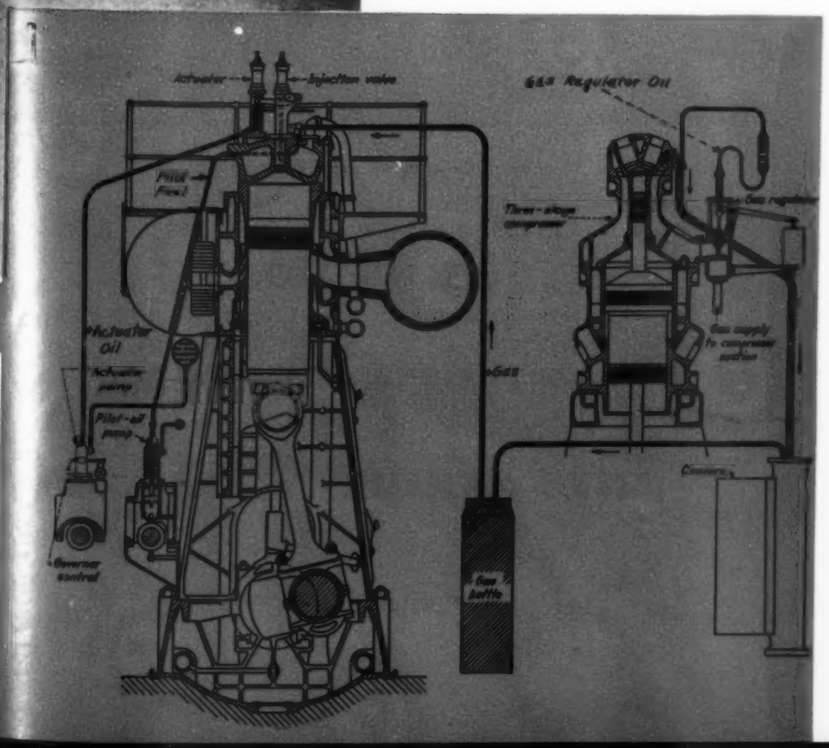
Air intake of each engine is filtered separately by the same type of filters that filter the ventilating air for the building. All the filters for both the engines and the building are enclosed in monolithic concrete buildings, which are attached to and form a part of the main building.

Fuel consumption rates of the engines are not available for publication but the engines were purchased under the following guarantees:

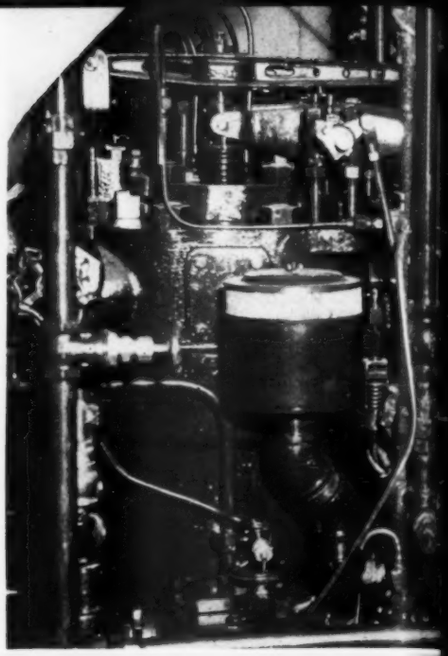
When operating on fuel oil of 19,000 BTU per pound			
Load	*4/4*	*3/4*	*1/2*
Lbs. per BHP Hour	.42	.43	.46
When operating on natural gas			
Load	*4/4*	*3/4*	*1/2*
BTU's GAS HHV per BHP Hour	7410	7060	7380
BTU's Pilot Fuel Oil per BHP Hour	500	600	700
Total BTU's per BHP Hour	7910	7660	8080

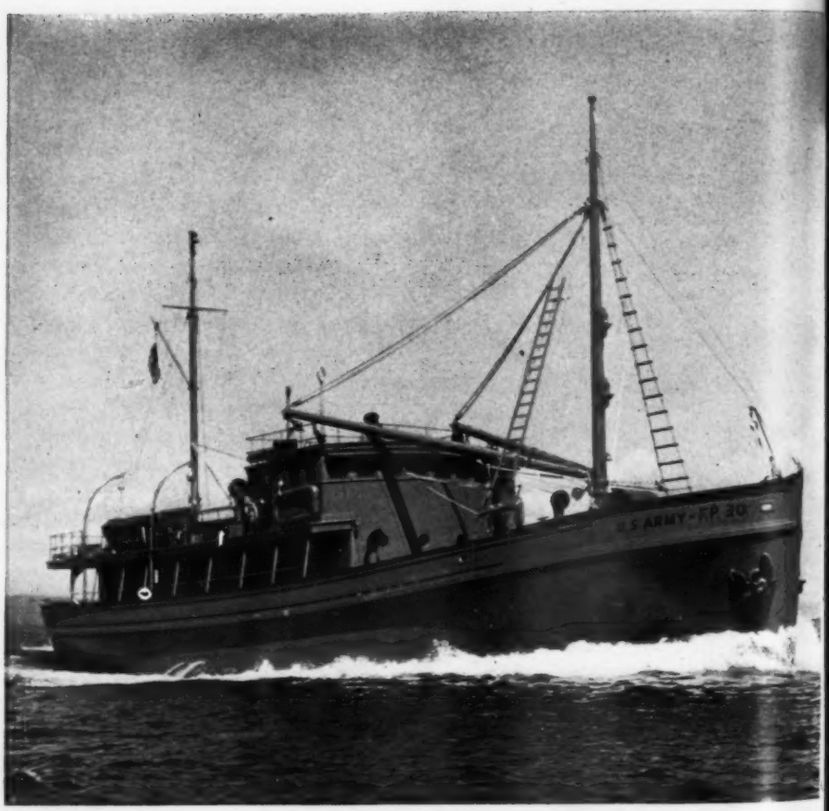
To insure a sufficient amount of power to furnish current for starting the plant after an extended shutdown and also to furnish power for the plant lights, water, laboratories and other miscellaneous use during a plant shutdown or a cut-off of gas supply, an auxiliary unit consisting of a 300-hp. gasoline engine direct connected to a 125-kw. 440-volt generator was purchased and installed. This small unit, except for periodic runs to insure its being kept in running order, will be used only for emergencies.

To supply DC current for operating the circuit breakers and emergency lights in case of power failure for any reason, a 60-cell 125-volt battery is installed in the basement. In case of a complete power interruption, a certain number of station lights are automatically thrown across the terminals of the battery. This arrangement insures against complete darkness of the plant, while the operator starts the emergency set.



Left to right: Frank Harthorne, 1st mate; Don Dederick master; and George Steiner chief engineer. Note Bendix engineroom telegraph.





One of the Army's new FP boats on trial run.

ARMY BOAT BUILDING PROGRAM HITS STRIDE AT TACOMA

By CHAS. F. A. MANN

BARELY a year ago the twelve yards building Wood & Diesel ships for the war effort in Tacoma Harbor, were all slanted directly or indirectly toward the Navy. Now there are four yards, and soon to be a fifth, busy building a fleet of fifty various special types of husky Wood & Diesel vessels for the Army's huge and rapidly expanding fleet.

Sticking close to traditional tried and tested methods of Pacific Coast ship builders, operators and designers, and openly fond of already proved types of machinery—the simpler and more rugged and the fewer the auxiliary gadgets the better—the Army has won quick welcome on the part of some 25 shipyards in the North Pacific region for its frank attitude that admits little previous experience with the sea, but give us the best, simplest and most durable of what you think will fit our exacting needs, and go to it as quickly as you can, boys, for time is running out and America must win this war. The result is a voluntarily helpful, speedily cooperative attitude toward the Army's complex program, unheard of on the North Pacific range. And the Army is getting ships so fast it will make your head swim when the time comes to reveal statistics.

They're too busy in the Army to bother naming most of its fine new fleet, so, like all the rest,

Nels Johnson, Atlas Imperial guaranty engineer at the controls. Note Almo pyrometer and Weston tachometer.

Left to right: George Steiner, chief engineer, R. D. Slain, U. S. Army inspector and Atlas' engineer Nels Johnson.

the U. S. Army FP 30 simply denotes a type of ship and the numerals at the end, which one.

One of the pioneer builders of Wood & Diesel ships on the Pacific Coast, last Fall spawned the Petrich Shipbuilding Corporation on City Waterway, Tacoma, on the site of a heavily-built former Marble plant, adopting ceiling heights, craneways and dimensions after a former plant capable of handling objects heavier than the heaviest commercial steel. Western Boatbuilding Company, in Tacoma, operated by the Six Petrich's—headed by Father Martin Sr., heretofore concentrated on Navy ships for the war effort. So they planned and built a brand new company, with large machine shop subsidiary next door, all enclosed and all designed to use the technique of mass production on wooden ships for the first time, and went after Army contracts exclusively. The result is that this company actually became the first mass-production, or prefabrication wood shipyard on the Coast, maintaining excellently the forty-year tradition of the owners at being first at everything, and became the first Puget Sound yard to deliver ships to the Army.

The FP type is basically a rugged, very broad, very seaworthy hull design borrowed from earlier H. C. Hanson designs for Alaska operation in the commercial field, Diesel engined and fitted for freight and passenger and supply operation in small harbors and on long stretches of open water.

Six of these ships were ordered from Petrich Shipbuilding Corporation, and by means of but two parallel ways and use of pre-fabrication of ships sections, just as in the welded steel technique, using the heavy bridge cranes high in the ceiling to hoist them clear of all workmen, four ships at a time have been under construction. The first one got away without even a photo, followed in about ten days by the FP 30, of this story. Before this story appears in DIESEL PROGRESS, all six will be finished and away to Alaska or the South Seas, to supply outposts of the Military service, and the Petrich yard will be busy on newer and bigger Army work for Fall delivery.

The FP type is 114 ft. x 27 ft. x 13 ft. 4 in. depth, with 10 ft. draft aft and 9 ft. draft amidships, built entirely of heavy sawn Douglas fir construction, with the usual bristling of galvanized spikes, bolts and bronze fastenings. Frames are double, and the keel itself is heavier than a 1920 model Purse Seiner, built of four pieces out of four giant trees, laminated together, with the engine foundation stiffening the whole aft of the centerline. Six watertight compartments (to main deck) are featured, with welded steel bulkheads bolted to the ribs and keel, for lightness and thinner cross sections, and fireproofing between engine room and the forward cargo hold and passenger space below, aft. All wood is treated with Cuprolignum and the usual tricky layout of air spaces, salt packs and careful caulking of seams, as only the Northwest Wood Artists know how, make these hulls as nearly rotproof and leakproof as possible. Some say even more leakproof than steel hulls.

For operation in either the torrid Tropics or frigid North, these hulls have no equal, for with their thick, closely spaced framing and deck members, thick double side and deck skins, they are as perfectly insulated as a thermos bottle, and it has been carefully estimated it would cost over $50,000 to insulate a steel hull for the same degree of insulation, as obtained in these hulls, and there is no dripping from condensation in these hulls and the paint sticks like glue. Oddly, the hulls are more fire resistant than thin-member steel hulls, because of low heat conductivity and slow-burning of massive timbers. Obviously the Army's procurement boys are pretty wise.

The hull arrangement provides for a chain locker forward, holding 100 fathoms of 1 in. chain, directly above which is the crew's shower and roomy toilet facilities. Next follows roomy quarters for eight crew members, followed by a large cargo hold with a capacity of 120 tons. Then follows the engine room with a pair of

Left to right: Captain H. H. Hubble, resident Army inspector; R. D. Slain; Geo. Steiner; M. A. Petrich, president Petrich Shipyard; Captain Don Dederick, master; H. M. Petrich, secretary; Frank Harthorne; Nels Johnson; James Petrich, chief draftsman; and sitting, Martin Petrich, Jr., plant supervisor.

11½ x 15 inch Atlas heavy duty Diesels, each developing 320 hp. at 300 rpm., direct air reversing and salt water cooling system. Two Reiner auxiliary Diesel sets are mounted outboard on the sides of this large engine room, in addition to welded steel fuel tanks with a capacity of 11,000 gallons and three welded steel air bottles and the electric control panel.

Aft of the engine room are three large staterooms for the engine room officers and passengers, together with roomy toilet facilities and suitable lockers. Directly above the aft quarters space is the large ward room used as both a dining saloon and loafing spot and for day passengers.

The large full-width galley has a 4 x 6 x 7 ft. box and an oil burning range, and stainless steel sink, together with a small mess table for the crew. Forward of this area are two large double staterooms with wash basin, steam heat, roomy locker space and outside access. Above on the top deck is the full-width pilot house with Moore Electromechanical steering gear, two-way Northern radio, Bludworth direction finder and access to the large captain's quarters and radio room. Two lifeboats are fitted aft.

The main Diesels are not pilot house controlled, and have conventional engine room telegraph units. The main engines weigh 40,000 lbs. each, dry weight, and are 16 ft. 10½ in. overall in length, and have Duplex oil filters, Maxim silencers, Alnor Pyrometers and Weston Tachometers, and built-in Kingsbury Thrust bearings.

The twin John Reiner auxiliary units are powered with 6 cylinder Hercules Diesels with 3¾ x 4½ in. cylinder dimensions, and equipped with a 24 volt starting motor. Each unit drives through multiple V belting a 20 kw., 135 volt D.C. generator; a 20 cfm. Quincy air compressor and a bilge, fire and general service combination pump, through separate clutches. All of the four components are mounted on a 2 level steel frame, neatly out of the way of everything else in the engine room. A Viking fuel oil transfer pump, of 30 gpm. capacity is fitted, as well as a Groco heat exchanger for the Hercules Diesel's closed fresh water cooling system. A Philco 56 cell battery set is fitted, as well as a 7 kw. belt driven Westinghouse generator off one of the two main Diesels, a typical fishing vessel layout built around a large excess capacity storage battery system. An American radiator heating boiler with Johnson burner supplies heat to all the ship and a 1 hp. Frigidaire unit, Freon gas, is fitted in the engine room space above one of the fuel tanks. An 11-unit Walter Kidde CO2 fire system is fitted.

The interior finish is 100% enamelled waterproof Douglas fir plywood with hardwood doors. For working in ice Australian Ironbark shoes and guard rails are fitted.

The deck machinery, all built by Mr. Lee Bennett of Seattle for the entire FP Army fleet on the same pattern, consists of two cargo winches with 10 hp. Crocker Wheeler motors and waterproof controls, and a 15 hp. Bennett windlass for handling the 600 fathoms of chain and 1,000 ft. of ⅞ in. plow steel cables and the three anchors. Two 3½ ton cargo booms are fitted to handle freight through the deck hatches forward, and a double towing gypsy is fitted aft.

Equipped for long days at sea, in every kind of weather, these ships will carry 8 night, and 50 day passengers in addition to stores and cargo, and are good for a 12 knot turn of speed with engines full open, rather remarkable for hulls of this design. The FP boats for the Army will give excellent account of themselves, and can be converted into full cash at resale for any of a dozen kinds of commercial operators, a thoughtful gesture for postwar liquidation of the huge inventory of Army vessels many of which, it is fairly certain, will be available.

Above: Carving a new farm out of sage brush. This International crawler is working 1200 acres into shape to meet Uncle Sam's call for a 10% increase in Idaho spuds. Left: The "Big Baked Potato" rides to market behind this General Motors Diesel truck.

IDAHO POTATOES AND DIESELS

By F. HAL HIGGINS

THE Big Baked Potato of Idaho went to war last year and is still in there fighting for Uncle Sam. Trainloads of this "top of the spud world" have been bought and stored for Army and Navy use in San Francisco over the past year and a half to insure our men in uniform the best in this vegetable. To meet the U. S. Government's demand for 10% more potato acreage last year, growers stepped up their acreage of this main crop just that amount and, with perfect weather and lots of long sixteen-hour farm work days, they really hit the jackpot in delivering an all-time record yield for the state and of the highest quality.

It was the writer's pleasure to get into Idaho and meet the men who produce and market the famed BBPs three times during the growing season. He was there just as the first potatoes were coming up to be nipped slightly by late frosts. Again, he was back in early July when the job of cultivation was at its height, and finally a month before harvest when everybody was holding his breath and scanning the skies with a prayerful greeting, "If frosts will hold off one more month, we'll have the greatest crop of all." Well, they got the weather breaks to go with their acreage and hard work, and Nature did the rest.

Nature, by the way, when the Idaho potato grower tells you about her work, is really wonderful in putting together the chemistry and physical ingredients needed to make the perfect potato—the Idaho Russet. First, there is the "volcanic ash" soil that is spongy enough to yield to the growth of the young tubers when they start expanding under the soil surface on their way to full grown spuds. Other soils won't "give" like this light volcanic ash and cause misshapen and gnarled tubers, they say.

The cold soft water melted from the mountains above the Snake and Upper Snake Rivers also meets Nature's call for the proper ingredient to make the perfect potato. Add the cold nights of the growing season and you have the soil-water-weather combination that Nature has put together on which man can use his head, hand, and machines for perfection in potato. The Idaho growers have both their marketing co-ops and their rugged individual growers who market their own and handle their neighbors' potatoes, too. The Idaho Falls Potato Growers, Inc., with warehouses at the city of the same name, as well as at Blackfoot, Burley and Shelly, Idaho, is the big growers' cooperative organization in this heart of the Idaho potato area. The leading individual growers who also act as brokers for many neighbors are the Holden Brothers, who grow 400 acres of potatoes and handle enough of their neighbors' production to market 1200 to 1500 cars a year. All are highly mechanized with many Diesel units in farming and transportation. The co-op owns a fleet of trucks, one of their big GMC Diesel trucks being illustrated here. This truck handles the long-haul transportation of the crop from Idaho Falls to Salt Lake City, Portland, Seattle, and even further on occasion.

With International, Allis-Chalmers, and Caterpillar dealers located at Idaho Falls, Pocatello, Twin Falls, and other potato growing centers, the Diesel tractor got a nice foothold before Government ban on sale of track-type tractors to farmers checked this progressive powering of the potato growers. Now, the Diesels in the hands of the farmers who had them give these growers an ace up in the race for economy in potato production. No Diesel tractor is obsolete, even if it were the first model turned out. They are the most valuable property on the farms that have them. Ditto for the trucks; the new GMC Diesel of the co-op was bought just in time. Idaho is at a disadvantage in marketing long distances from farms, as is much of the Northwest, especially in the inter-mountain areas. Hence, the cutting of transportation costs was important and effective in getting potatoes to market quickly and cheaply under war conditions.

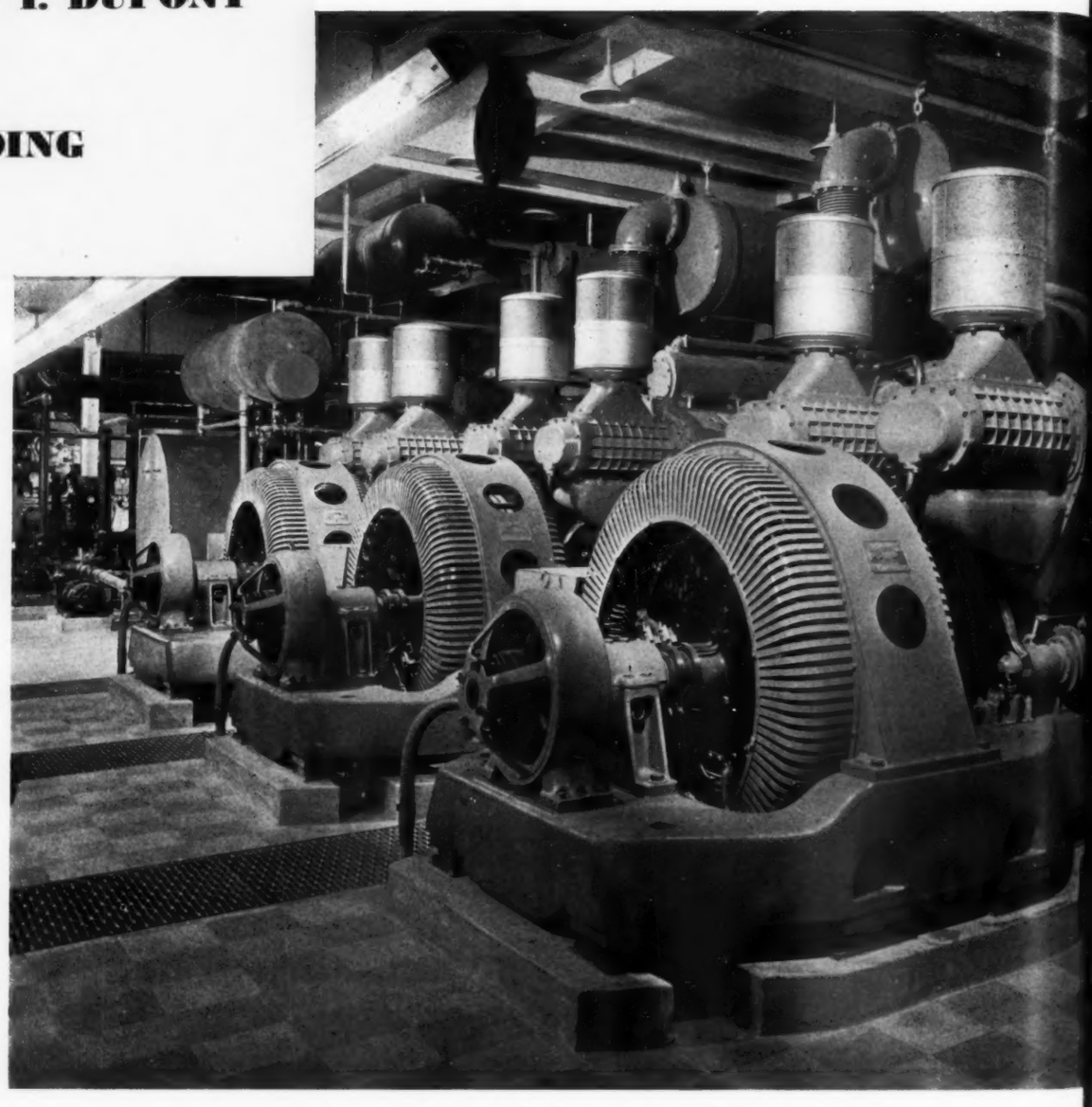
So, whether you order your Big Baked Potato in a Boston Hotel, on a transcontinental train, or in a Chicago restaurant, just remember its perfection and abundance—it will probably be one of only two or three foods not rationed if war continues another year—were aided materially by Diesels.

THE ALFRED I. DUPONT BUILDING

FOUR YEARS AFTER

By

EARL E. STEELEY*



General engine room view showing the three main General Motors Diesels and General Electric generators. Note Hussman spring mountings under each unit.

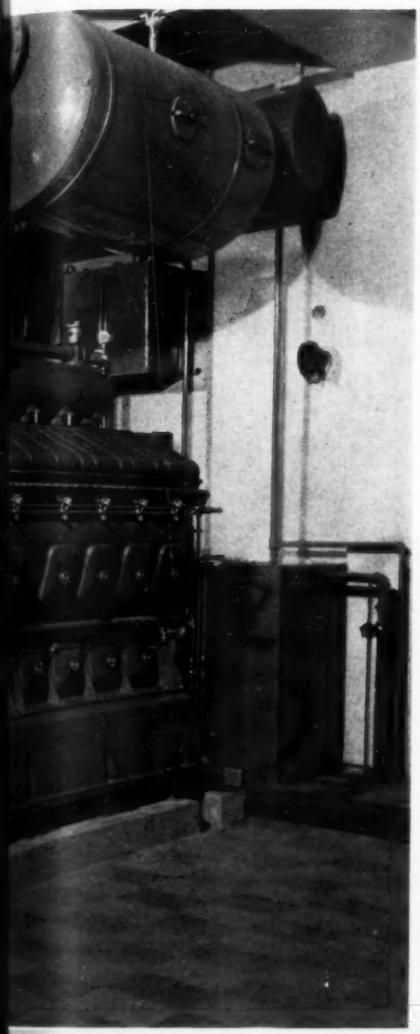
DURING four years of continuous operation the Diesel generating plant on which the widely known duPont Building in Miami, Florida, depends for all of its electrical and power services has established an outstanding performance record. This building, opened to the public early in 1939 was then and still is revolutionary in many respects, being the largest office building ever to rely entirely on Diesels for all of its electrical requirements.

Although fully described in the March 1939 issue of DIESEL PROGRESS—some of the outstanding features of the duPont Building and its power plant are reviewed here as a background for the Diesel plant performance record.

The building is air conditioned from top to bottom—an unquestioned tenant-drawing feature but also a heavy load factor on the power plant. This means that all parts of the building are air conditioned; offices, stores, the banking rooms of the Florida National Bank and Trust Company, occupying the entire second floor, as well as a 400-car garage which adjoins the main structure on the ground level. The building is 17 stories, 266 ft. high—next to the tallest building and by far the most modern of its size in Miami. Marsh and Saxelbye, Jacksonville, and Messena & duPont, architects of Wilmington, Delaware, designed the duPont Building; George A. Fuller Construction Company of New York were general contractors and Miller Electric Company of Miami were consultants on the power plant.

Thoroughly and successfully isolated as to sound and vibration the power plant occupies a specially constructed room on the ground level. Realizing the sheer necessity of precluding any possible annoyance throughout this de luxe structure the designers applied the most modern of insulating materials and equipment. The three main generating units are 16-cylinder General Motors 2-cycle Diesels, 8½ in. bore, 10 in. stroke, each rate 1,050 hp. at 600 rpm.,

* *Chief Engineer, Alfred I. duPont Building, Miami, Florida.*



direct connected to General Electric 700 kw. alternators. An 8-cylinder, 5½ in. bore, 7 in. stroke General Motors Diesel and 150 kw. General Electric alternator are installed to handle the night and week-end loads and to serve as a stand-by unit. All four Diesels are electrically started. The starting equipment consists of Delco Remy motors served by eight Exide eight-hour batteries having a total output rating of 385 ampere hours. A Tungar charger, taking current from the main generator exciters, automatically maintains the batteries in a fully charged condition. The battery circuit is arranged to carry the power plant lights in an emergency.

Now to take a quick look at the engine and plant accessories and then get on with our maintenance and operating story. The General Motors Diesels are fitted with as many built-in and attached operating accessories as are possible to make them self contained units. The fuel systems are protected by three passes through Purolator filters. Double filtration by Purolator units and centrifugal treatment is provided for maintenance of lube oil. The Diesel heat exchangers and air conditioning condensers are served by a Foster Wheeler forced draft cooling tower. Engine exhausts and intakes are fitted with Burgess snubbers. Woodward isochronous governors regulate engine speed. The General Electric-built and equipped switchboard includes complete instrumentation in separate panels for each generator unit. All four generating units are mounted on Hussman Spring Mountings which effectively isolate all machinery vibration from the building foundation.

In as much as the elevator installation in a building such as this imposes a peculiar type of load on the power plant and has a marked effect on its operation and maintenance a brief look at the elevator equipment is offered here. There are six, 750 foot-per-minute Otis cars each operated by an individual 30 kw. mg. set. One 10 kw. mg. set serves the bank elevator and a general service car. With all elevators in operation the demand on the Diesel plant from this source is 190 kw. It is noted, however, that the surge from the elevators has never adversely affected voltage regulation or lighting throughout the building.

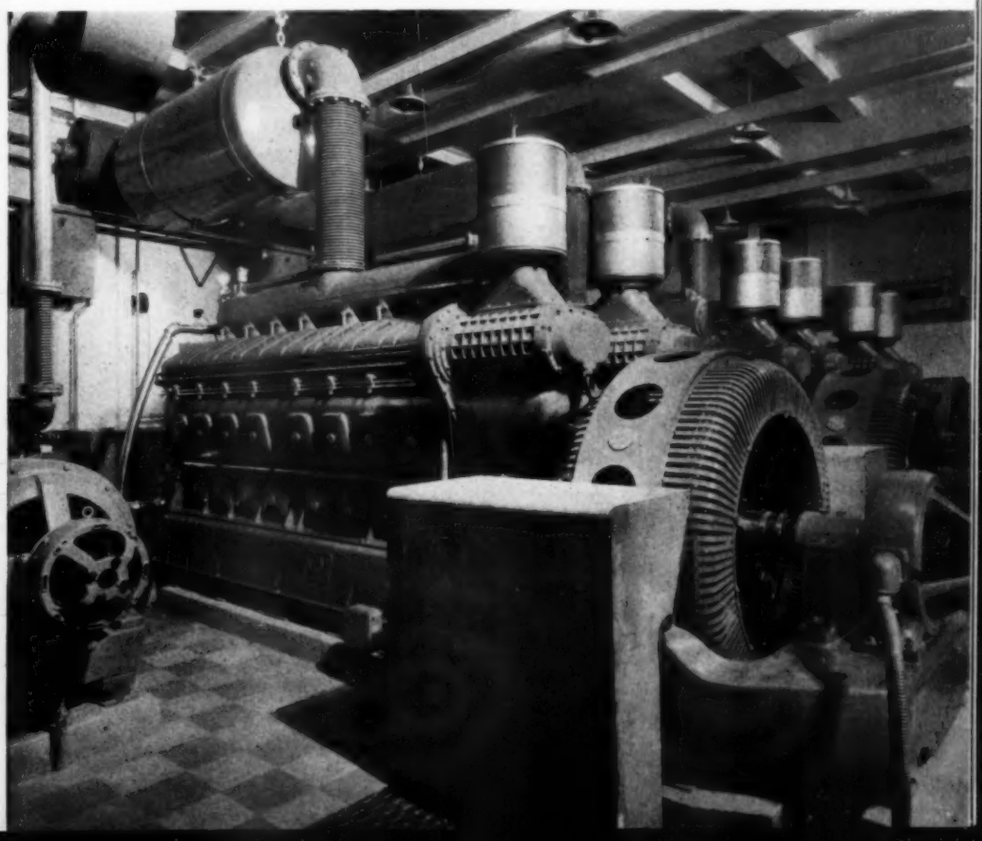
Because of the widespread interest focused on this Diesel installation at the time it was made and because of the pace it set in this field of application a planned regimen of preventative maintenance has been followed with splendid overall results as will be seen from the following four-year operating report.

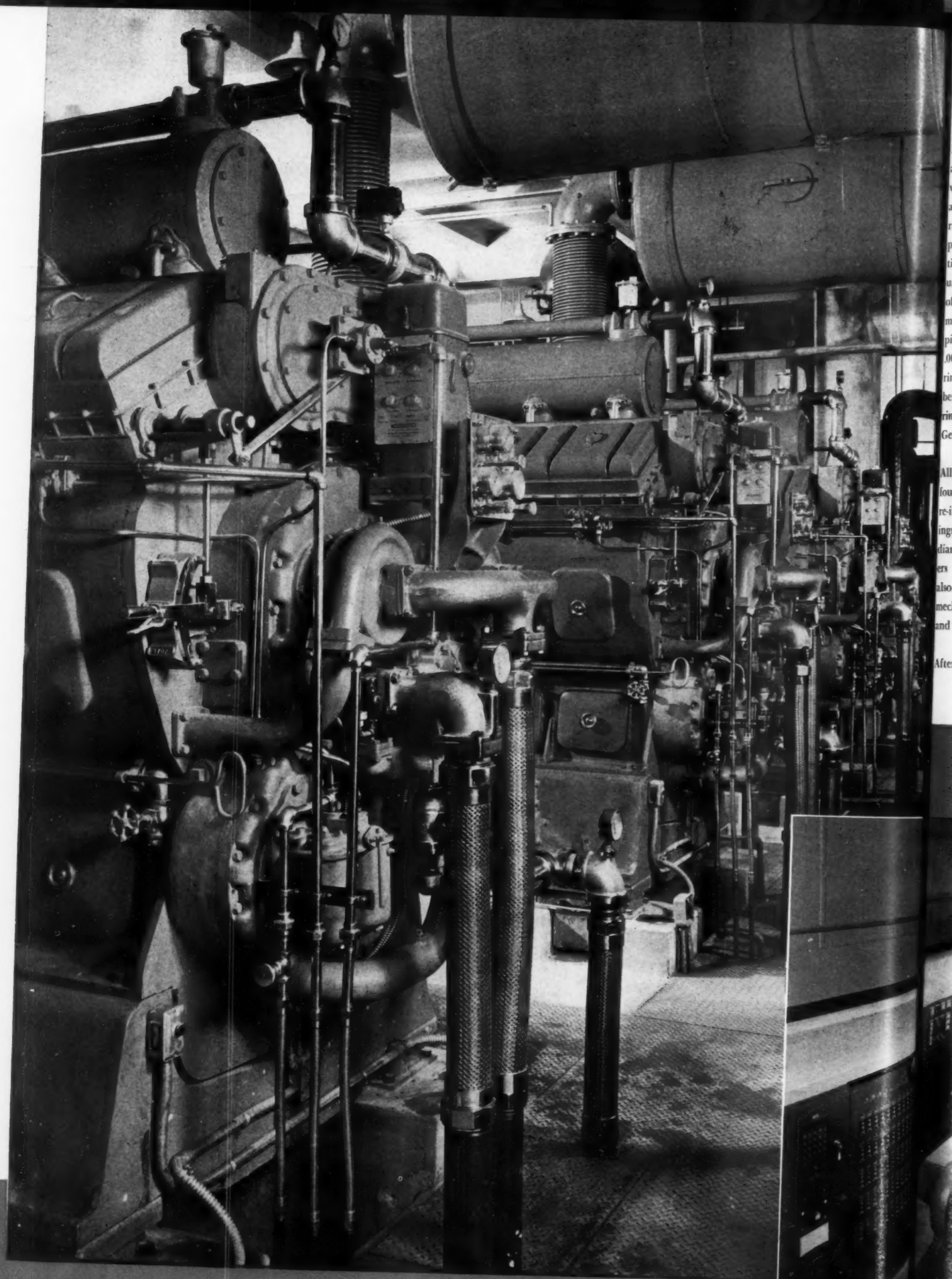
The plant as originally installed and equipped remains essentially the same after four full years' operation. The principal equipment changes include the addition of a Youngstown-

ALFRED I. duPONT BUILDING POWER PLANT
Recapitulation and Summary of Operations, Production, Maintenance, and Repairs.
April 1, 1939 to January 1, 1943.

Total hours engines operated,		
Unit #1	14,436	
Unit #2	15,440	
Unit #3	16,155	
Total hours of operation		46,155
Total horse power hours		48,462,750
Normal peak load K.W.		1742
High peak load K.W.		2546
Average Monthly Output,		
1939 9 months	K.W.H.	336,253
1940	K.W.H.	351,783
1941	K.W.H.	404,125
1942	K.W.H.	535,434
Average for 45 months.		413,530
Total Yearly Output		
1939 9 months	K.W.H.	3,026,280
1940	K.W.H.	4,221,400
1941	K.W.H.	4,849,500
1942	K.W.H.	6,425,200
Total 45 months.	K.W.H.	18,522,380
Average H.P.H. per gallon of Lube Oil		2,278
Average K.W.H. per gallon of Fuel Oil		11.54
Fuel Consumption.		
Gallons of Fuel Oil used.		1,604,146
Lube Oil Consumption.		
Gallons of Lube Oil used.		35,187
Enforced down time for repairs		None
Make of Rings.		
Standard as furnished by Electro-Motive-Division General Motors Corporation		
Cylinder Wear. 45 Months .0005 in. per inch of diam.		
Piston Wear .0005 in. per inch of diam.		
Make of Lube Oil used: Texaco Ursa, exclusively.		
Cost produced, including labor, maintenance, repairs, and supplies,		
Per K.W.H.		$0.00991

In this view of the main generating units are seen the Burgess intake and exhaust snubbers.





Closeup of the operating ends of the Diesels showing Woodward governors, Purolator fuel filters and Titeflex flexible water connections.

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Miller lube oil reclaimer and Michiana filters and Ross heat exchangers for both oil and water. The policy of progressive maintenance as advocated by General Motors has been carried out religiously, since first the plant was put in operation. After 24 months of operation or a total of 8000 hours per engine, each unit was disassembled entirely. Measurements of wear on the liners at this time was approximtely .00025 in., per inch of diameter. The piston wear per inch of diameter measured .00025 in. The ring wear on the top and second ring averaged in all pistons .075 to .100 in.; it being necessary only to replace the #1 and #2 rings with new standard rings, as furnished by General Motors.

All bearings after 8000 hours of operation were found to be in excellent condition, and were re-installed in the units. The wear on the bearings was approximately .0005 in., per inch of diameter. All gears, accessory gear drives, blowers were found to be in excellent condition also. The running gear, which we call the valve mechanism was in excellent condition, all valves and seats were cleaned and ground at this time.

After 16,000 hours operation and time period elapsed of 45 months, the machines were again one at a time completely disassembled for inspection and repairs. The liner wear was .0005 in., per inch of diameter. The piston wear showed .0005 in., per diameter, and the ring wear as found on the upper or #1 and #2 rings was approximately .075 to .100 in.

At this overhaul period after 45 months' operation, General Motors had developed a full floating type piston assembly. In order to keep the equipment modernized and in the best working condition, and take advantage of this particular accessible assembly, the full floating type piston assembly was installed in these three units. Since their incorporation in the three large Diesels, each unit has been operated approximately 700 hours. In order to keep the cost of installation of this new assembly down, liners were honed to .030 in., oversize, General Motors supplying the floating pistons in .030 in., oversize.

Experience so far with the floating type piston has proved to be note-worthy, as the unique design of the skirt of this piston allows the skirt to revolve on each power stroke, this in itself does away with egg shape wearing of the pistons and allows the piston skirt or connecting rod to be removed without disturbing each others. The bearings at this overhaul period, after 45 months of operation were again found to be in excellent condition, the wear was approximately .0005 in., per inch of diameter, and were again assembled in the units.

All gears were again found to be in first class condition, with the exception of one or two thrust washers showing wear in the idler gear thrusts, which were renewed. Again the valves were ground and the cylinder heads cleaned up, and all original equipment is still in use.

The flexibility incorporated in this plant, by reason of three like units being installed, the load demand determines the operation of one or all units. At the present the U. S. Navy, and the armed forces occupy approximately 90% of the building. This has greatly increased load demand as well as increased production considerably. During the working day it is now necessary to operate all three units at approximately 75 to 80% load. The evening and night load requiring two machines to be operated at 75 to 80% load.

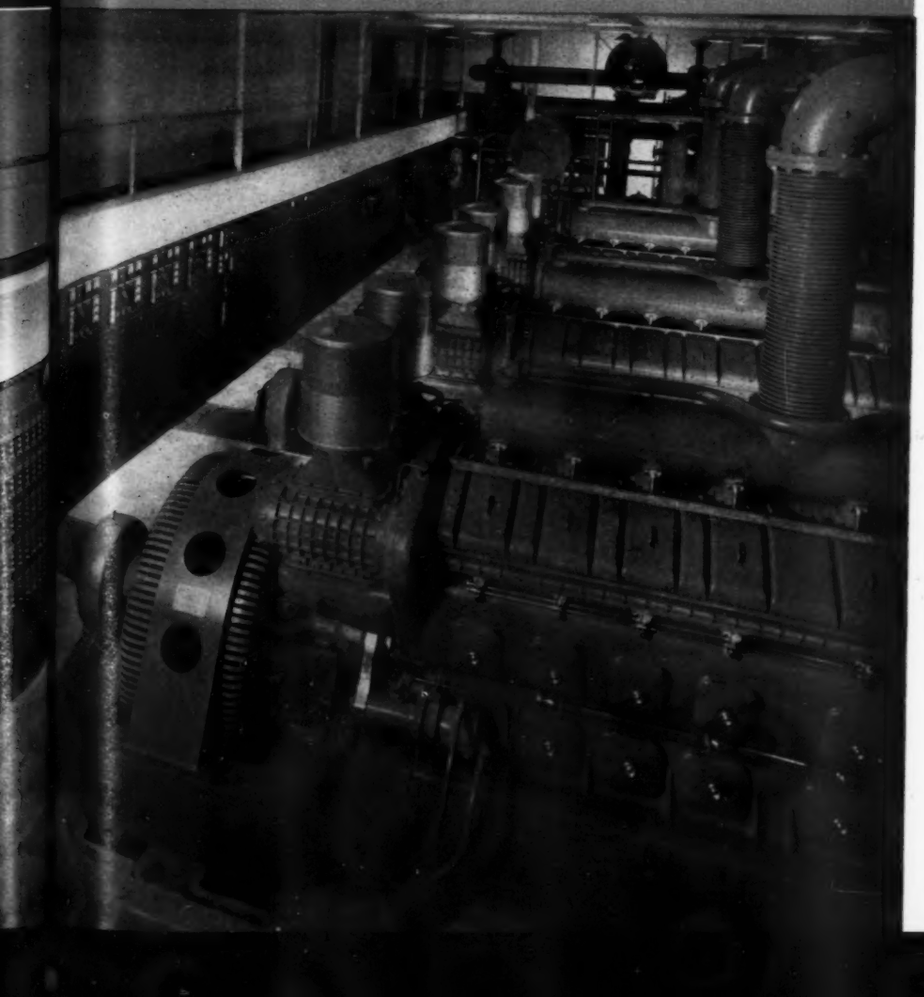
Again speaking of the flexibility in operations in this plant, there have only been 7 minutes 26 seconds accumulated power failures since operations first started in Feb. 1939. These failures are due mainly to the human element which cannot be entirely eliminated. Again due to the progressive maintenance theory as advocated by General Motors Corporation and practiced entirely in this plant, only one failure has occurred since operations first started in Feb. 1939. This was caused at a time when only one unit was in service and a fuel pump shaft sheared the key-way.

It might be stated here that the fuel injectors are less trouble than the ordinary spark plugs would be in one's automobile; of course they are periodically repaired, worn parts discarded, new ones installed, tested, and again put in service.

A #2 grade of Diesel fuel oil is used, and is supplied by The Belcher Oil Co., of Miami, Florida. Texaco Ursa, medium heavy lubricating oil has been used exclusively, throughout the plant, since it was started four years ago.

The Alfred I. duPont Building is owned and operated by the Florida National Bank & Trust Co., of Miami, Florida, Mr. L. A. Usina, President. The Alfred I. duPont interests and the writer wish to express their thanks to the General Motors Service Managers for their co-operation and advices, and prompt attention to the requirement of necessary repair parts.

The switchboard, extending the full length of the engine room is GE made and equipped.



DIESEL SUPPLIES MEAT FOR

By DWIGHT ROBISON

WITH United States' demands for meat, both domestic and lend lease, reaching new highs, the packing houses of the nation are operating at capacity, night and day. But packing calls for power, another precious commodity in which there is now a threatened shortage. In these days, self-powered plants, like the Minneapolis house of the Superior Packing Company, are able to make an important contribution to the nation's food requirements without further overloading its power facilities. Superior is now killing 500 head of cattle a day and a single 300 hp. Fairbanks-Morse Diesel is operating twenty-four hours a day to supply the required power.

A twenty-four-hour schedule is nothing new for this engine. Since it was put into service on November 1, 1938, it has carried the load twenty-four hours a day, 350 days a year. In the first three full years of operation, the Diesel ran more than 25,000 hours and generated 3,273,767 kwh. This power was used to kill, dress, and refrigerate 253,978 head. The company calculates that the saving on power costs under purchased power rates amounted to more than $25,000. During 95% of the time the Diesel has been in operation, running always at substantial loads, there has not been a single interruption of power.

Here are the figures on head killed and kilowatt-hours generated for the three years:

Year	Head Killed	Kwh. Generated
1938-39	81,712	1,032,567
1939-40	86,811	1,084,000
1940-41	85,455	1,187,200
Totals	253,978	3,303,767

The present rate of 500 head a day represents a tremendous expansion of production, although the record of the previous years was then considered plant capacity. To supply this augmented demand, the Diesel cannot work longer hours; it can only carry heavier loads. Over-loads are commonplace. This is the kind of load the engine carries more than 4,000 hours at a time without a stop. The unit is shut down only twice a year for a thorough inspection and servicing. Once it is back on the line, the Diesel is expected to run steadily for another six months. It has never failed.

Superior uses considerably more electric power than the average packing house of its size but that is one of the secrets of high production in a comparatively small plant. It installed one of the first all-electric killing floors in the country and the fourteen motor-driven hoists are a major power consumer. Also dependent on the Diesel are the elevators, brine pumps, two ice machines, the lighting system, casing machine, hasher, grinding machines, deep well pumps, a circulating water pump driven by a 40 hp. motor, a 50 hp. shredder, a 50 hp. feed mill, and other miscellaneous equipment.

The table herewith gives the operating picture for the year ending October 31, 1941, the third full year of Diesel service. It is easy to see the continuous production at heavy loads, for it is far from common to find a 300 hp. engine producing nearly 1,200,000 kwh. in a year. Fuel consumption of 102,810 gallons means a production of 11.55 kwh. per gallon.

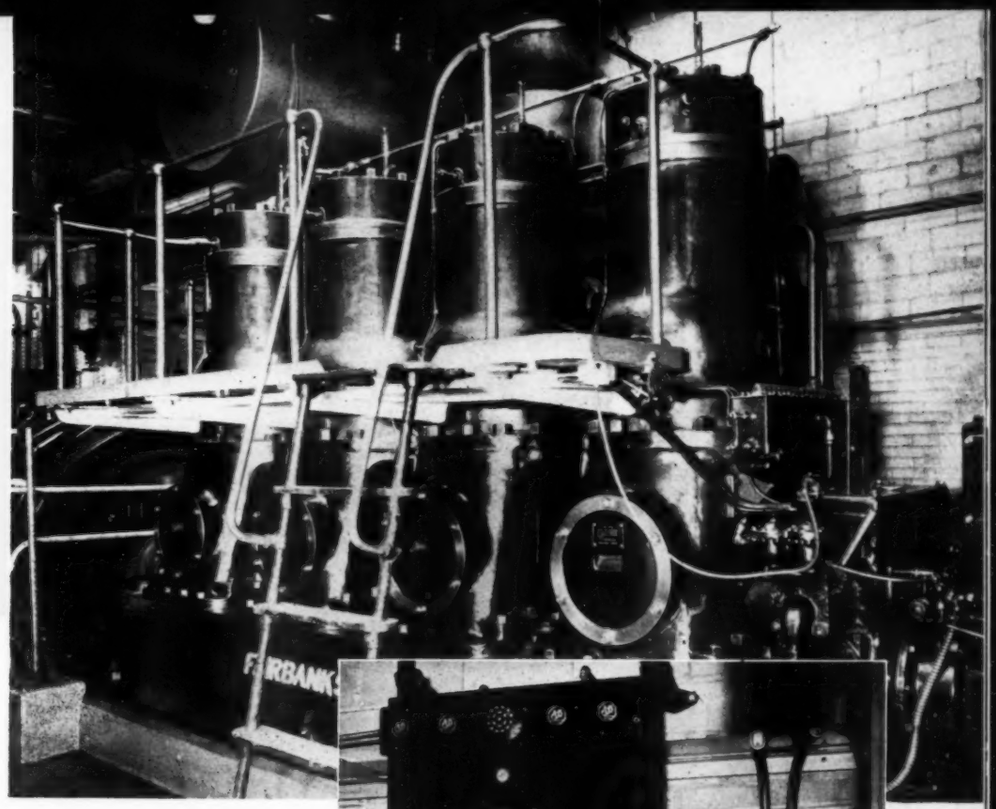
A dependable, continuous source of power is important to Superior Packing, but the subject of costs also carries a lot of weight. M. H. Magers, company superintendent, calculates every month the cost of power consumed at prevailing purchased power rates. If the company had purchased its power requirements for the year discussed in the table at the average rate of 12 mills per kwh., the total cost would have been $15,706.48. Diesel operating costs for the same period totalled $6,692.15, a saving of $9,003.73. The Diesel operating costs includes fuel, lubricating oil, maintenance, and maintenance labor, taxes, and insurance. All labor expended in maintenance work is included in the cost of maintenance. No other labor cost is figured since there were no additions to the payroll occasioned by the installation of the Diesel. A man with other regular duties fills the day tank at the beginning of his shift and takes the hourly instrument readings. That is about all that he has to do in connection with the Diesel. With total cost, including taxes and insurance, at just 5.64 mills per kwh., the savings already have more than paid off the entire cost of the Diesel. Present annual savings of more than $9,000 are added to company profits.

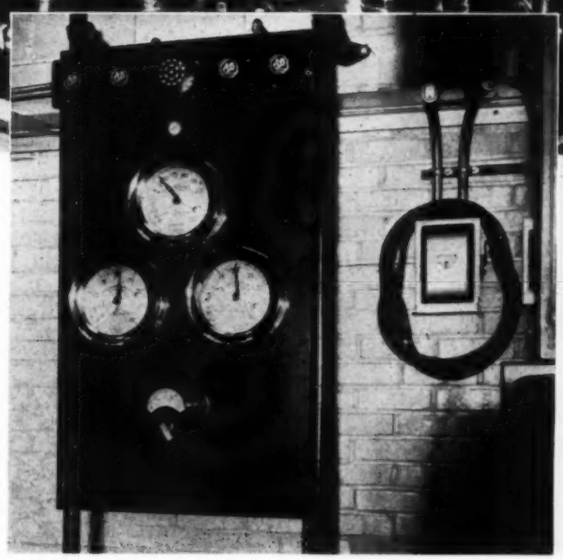
Month	Kwh. Generated	Gal. Fuel Consumed	Kwh. per Gal. Fuel
Nov. '40	82,240	7,040	11.68
Dec.	112,000	9,500	11.79
Jan. '41	89,440	7,660	11.68
Feb.	93,120	8,010	11.62
March	89,440	7,750	11.54
April	114,880	9,760	11.77
May	94,240	8,260	11.41
June	95,680	8,400	11.39
July	113,600	10,010	11.35
Aug.	96,640	8,380	11.53
Sept.	117,600	10,340	11.37
Oct.	88,320	7,700	11.47
Total	1,187,200	102,810	Average 11.55

The prime mover that is making this impressive performance record is a 4 cylinder, 14 in. x 17 in., two-cycle, mechanical-injection, Fairbanks-Morse Diesel, rated at 300 hp. at 300 rpm. It drives directly a 200 kw., 3-phase, 60 cycle, 240 volt F-M alternator with 7.5 kw. v-belted exciter.

The engine has the protection of a closed cool-

THE NATION





Left: General view of the Superior Packing Company plant, Minneapolis, Minnesota. In three years, this 300 hp. Fairbanks-Morse Diesel, operating twenty-four hours a day, 350 days a year, has a record of 25,000 hours' continuous running. Right: The gauge panel carries Marshalltown gauges and Alnor pyrometer.

ing water system. An F-M motor-driven centrifugal pump circulates soft water through the engine jackets and a Schutte & Koerting shell-and-tube heat exchanger. Make-up water is treated in a Permutit softener. Raw water is piped to the heat exchanger from the 550 gpm. Worthington centrifugal pump that supplies the entire packing plant. A hand-operated valve regulates the quantity of raw water that flows through the exchanger. The initial source of all the company's water is a group of deep wells on plant property.

Texaco Algol is used to lubricate both bearings and cylinders. The bearings are of the ring oiling type while the cylinders are supplied with oil by a Madison-Kipp force-feed lubricator. Consumption is about four gallons in twenty-four hours. Wiper ring oil is collected and purified in batches in a home-made reclaimer which combines heating coils, a compressed air agitator, and a settling tank.

The No. 2 fuel can be delivered either by truck or rail tank car since a main rail line runs right past the plant. Trucks unload by gravity into the 14,000 gallon underground storage tank, but a motor-driven F-M rotary pump is used to unload tank cars. The same pump is used to transfer fuel from storage to the 300 gallon day tank under the engine room floor. The day tank is filled every eight hours. The engine supply pump takes fuel from the day tank through a Pittsburgh Equitable meter and a pair of strainers and feeds it to the small engine supply tank in which the cylinder injection pumps are immersed. A Woodward Type IC governor regulates the quantity of fuel injected to meet varying load conditions.

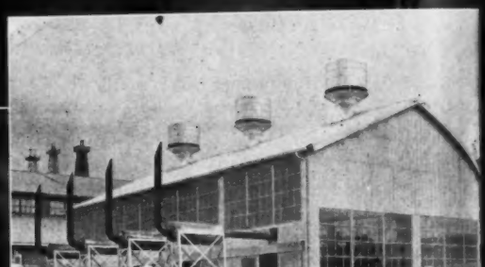
Scavenging air for this crankcase scavenging Diesel is drawn through a stack to a set of American impingement-type air filters in a metal housing inside the engine room and thence through a header under the floor to the engine. Exhaust gases from each cylinder flow down to a common pit under the floor and up through a vertical silencer within the room, venting through the roof.

Since the Diesel runs for the most part without attendance, it was thought advisable to provide a complete alarm system. The alarm sounds if water temperature in the engine jackets gets either too high or too low, if jacket water pressure drops, if raw water pressure drops, and if the fuel level in the engine supply tank falls too low. The alarm panel also holds an Alnor exhaust pyrometer which the operator consults every hour. The six panel Commonwealth switchboard holds a rocking contact G. E. voltage regulator, two G. E. totalizing kilowatt-hour meters, a Westinghouse totalizing and recording watt-hour demand meter, and a set of Roller-Smith instruments.

Starting the engine is a job the operator does only twice a year. The starting air is provided by a F-M compressor V-belted to an electric motor and is stored in two Pressed Steel tanks.

The Superior Packing Co. has demanded a great deal of its Diesel plant but every demand has been met. The three-year record tells the story succinctly: more than 25,000 hours without breakdown or major repair, 253,978 head killed, 3,273,767 kwh. generated at a cost of 5.64 mills kwh., more than $25,000 saved. Even greater demands are being made today when America must feed herself and the United Nations, too.

OIL FOR A NATION'S INDUSTRY



Top view: Four Ingersoll-Rand pumping engines operating on gas fuel. Note American-Bosch magnetos and Nugent lube filter, center foreground. Above: Exterior view showing Vortox exhaust silencers and Burgess intake air filter-snubbers.

Caterpillar Diesel tractors double up and dig their toes in with half load over the big humps.

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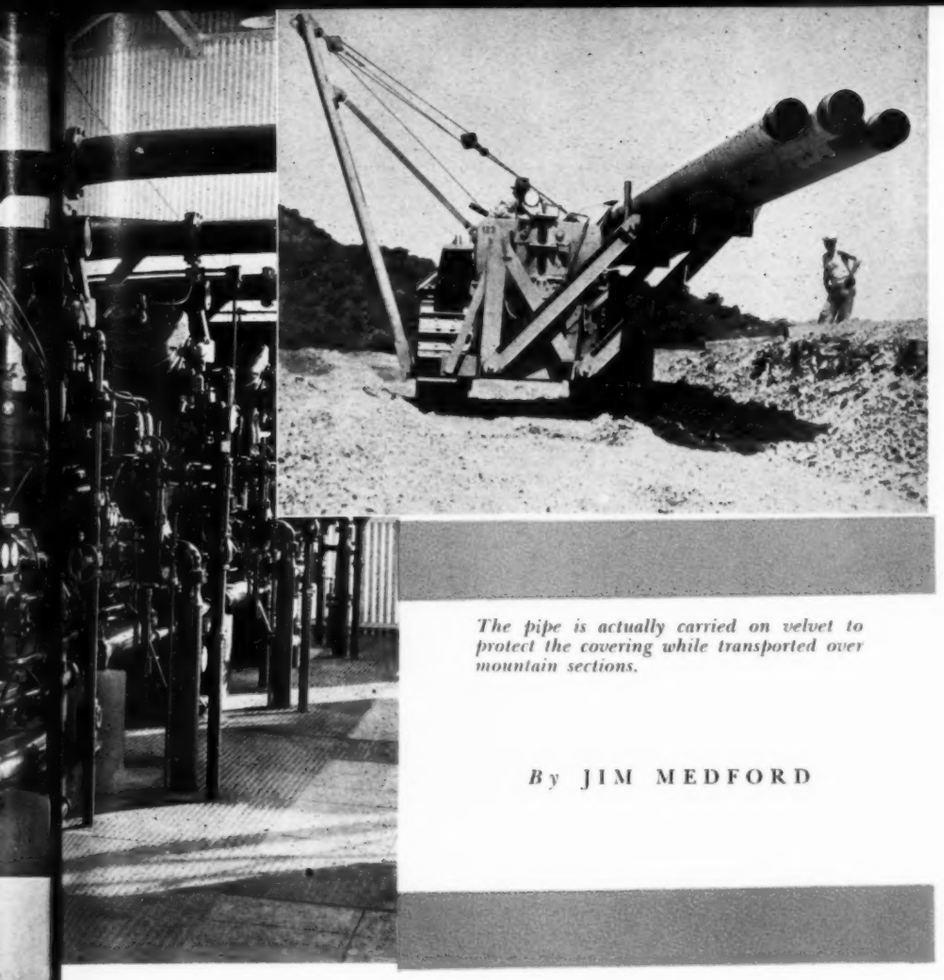


The pipe is actually carried on velvet to protect the covering while transported over mountain sections.

By JIM MEDFORD

OIL for the lamps of—Well, it makes no difference. It's a matter of getting it from where it comes out of the ground to where it's going to do the most good. There was a time, some can still remember it, when the popular way was to put it in floating equipment known as tankers. But coastwise, they don't use them any more. No, sir, it's pipelines, more and more, south, east and west. The reason? That's not a part of the story.

About the time this pipeline was being completed the daddy of all pipelines was under way—1,261 miles including branches crossing seven states, but this little fellow is only 83 miles long, a large part leaning slightly from the perpendicular. The constructors didn't use ice blocks to lower it into its sinuous grave, as has been done in Georgia; neither did weights to bear it down become necessary, as in the state of Texas.

To get things going the right way special equipment had to be built that could be likened to a fly on a wall; a main pumping plant had to be built and a booster plant had to be worked out to deliver the 40,000 barrels daily to the refinery. They did it with a full week to spare on the sixty-day "must" contract – 10¾-inch pipe all the way. This was the joker in the setup, but there was no jinx—careful planning beat that.

Now, to know what sixty days for eighty-three miles means, you must know the tricky terrain that line traverses with its 9,000 tons of mastic coated pipe. There's everything in the path of this speed—citrus groves, rivers, cattle ranges, studio sets, cities, *and mountains.*

It was these mountains, a ten-mile stretch of up-and-down, where the going was tough. It was a Diesel "cat" job all the way. But the hill country demanded something extra in the way of Diesel equipment. Because the pipe was precoated with asphalt that must not be fractured it couldn't be skidded into place—not a section. Several ideas were tried out before the thinking became serious and a smart maintenance super came up with a clever idea that worked. It's too bad he must remain nameless along with the other engineers who contributed to this *Shangri La.*

On a D8 Caterpillar Diesel tractor was built an elevator that would lie down like a camel on a side hill, load seven lentgsh of 40-foot pipe with a total weight of seven tons onto "velvet", then winch it up overhead like a "Sahara mule" with the string-halt and lurch off over the scenery, all without marring a decimal inch of the insurance coating.

And I want you to get the point on "velvet". It's a fact—the bolsters on the elevator were actually swathed in a beautiful shade of grey velvet. Now it is unfair to repeat the engineers' claim, that it was to match the M. S.'s eyes. "It's sabotage of my character," says the gentleman; "I couldn't get any other kind!" The guy's indignant; tough, too.

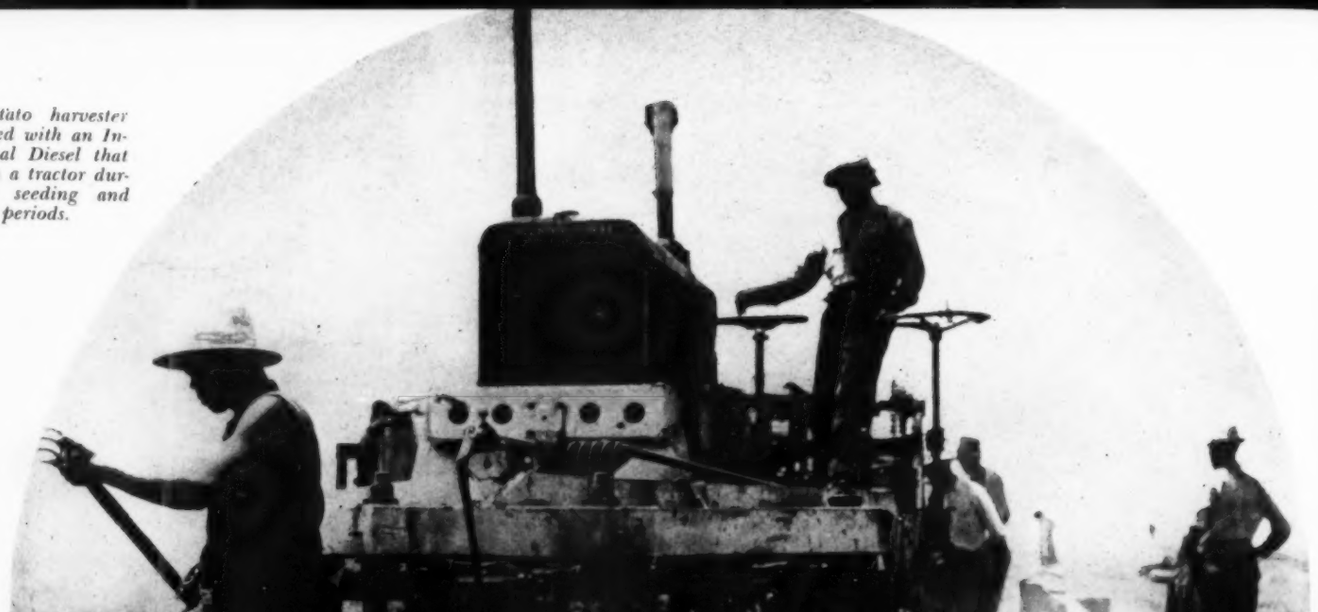
But even a D8 tractor found the airplane slopes too much in places. In the worst spots it was necessary to reduce load to four pieces of pipe, eight tons, and then tie on another D8 to make the humps. Note the illustration.

In the meantime back in the Oil Town headquarters the power plant was being pushed, too. Four six-cylinder, V-type, 275 hp. natural gas engines were installed on heavy concrete foundations reaching down to bed-rock to overcome the characteristic moist conditions of the light sandy soil. These engines drive through 1:8.96 step-up units propelling four-inch, four-stage centrifugal pipe-line pumps, delivering 275 hp. each at 400 rpm. The pumps deliver 22,000 barrels per day or 40,000 daily barrels with booster station's pair of 485 hp., V-type, gas engines cut in. Booster engines operate at 300 rpm. through same type of step-up gear as installed at main plant with pumps turning 3,600 rpm.

Developed along conventional lines, piping arrangement has been given special attention. A central board receives all instrument connections and is installed in the main office of the plant building. Equipped with suction and discharge headers, all exposed above ground, the piping is manifolded to permit series or parallel operations in conformity with refinery demands. Engines are individually controlled and are air started. Flexibility is a feature of the entire installation.

The cooling system serves a three-fold purpose—for engine jacket water, crankcase oil and the step-up gear assembly. Two-unit radiators with gasoline-engine-driven fans, divided into two sections, serve this three-way cooling system.

In addition to the Ingersoll-Rand natural gas engines with Westinghouse step-up gears, other items of equipment include—American Hammered piston rings; Pickering governors; Nugent lube oil filters; Vortox intake air filters; Burgess exhaust snubbers; Fulton Sylphon cooling water controls; Ingersoll-Rand pumps and Crane water valves.



This potato harvester is powered with an International Diesel that served in a tractor during the seeding and growing periods.

DIESELS DOING DOUBLE DUTY IN WAR FARMING

By F. HAL HIGGINS

OUT in California the Diesel tractor and Diesel stationary irrigation pumping engines are accepted by successful farmers as essential to modern farming. The Diesel tractor came in right on the bottom of the depression and immediately lifted the farmer who could so equip himself off the losing list and over to the profit side for the first time in several years of post-war depression. From that first Caterpillar Diesel tractor that went into the Sacramento valley late in 1931 when a mere ten units were built by that firm to start its Diesel tractor on the way to fame, farmers bought them as fast as they could get them from the factory until war came. Estimates of University of California agricultural engineers this year put the horsepower of tracktype tractors in farming at 40% of all tractors used in the most highly mechanized agriculture in the world. While it is hard to estimate accurately the percent of these tracktype tractors that are Diesel, it may be said that since 1936, practically all tracktype tractors sold in California are of such power, the trend being stronger and stronger as the economies became known and dealers in four different makes were able to get enough tractors to supply the demands.

One or two farmers in big operations in the delta area of the San Joaquin River valley have gone further with their Diesel tractors than have any others in the world. They wanted the economy of Diesel tractors on their row crop work as well as for their seedbed work.

Hence, the shops of the Zuckermans on McDonald and Mandeville islands a few miles west of Stockton worked out standards for shifting International Diesel engines from the chasses of their tracktype tractors to their own special 4-row potato diggers. As these big operators grow 1,000 to 1,500 acres of potatoes as well as 1,000 acres of sugar beets, there is year-round tractor work, excepting a few rainy weeks in January and February, normally.

So, this gives these International Diesel engines double service; first they prepare the seedbeds and plant the crops. Then they cultivate and harvest the potatoes. With yields of 300 to 400 bushels per acre and as high as 600 on some of the best land in good years, there is an enormous output of this crop in wartime. The U. S. Army bought the entire potato crop at a high figure last fall, so that the Diesels probably paid out a bigger farm profit than any Diesel tractors in any other area of the U. S.

Tomato transplanter made from salvage materials, pulled by an International Diesel tractor.

DIESELS STEP UP THE OLD "LOVE APPLE" FOR WAR

By

F. HAL HIGGINS

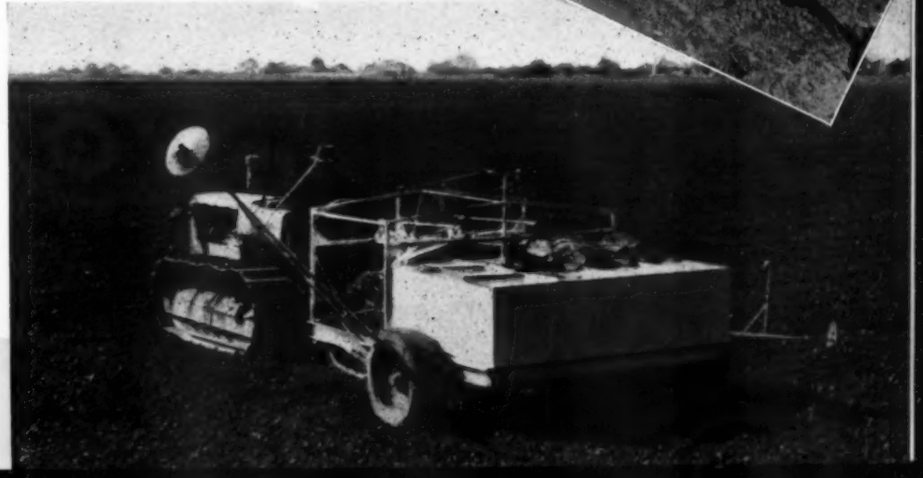
CALIFORNIA farmers produced 790,300 tons of tomatoes for canning last year, according to figures recently announced by the Federal Crop Reporting Service. This record figure was 116,000 tons above the previous year's pack, which in turn was nearly 100,000 tons above 1940's pack. That's a lot of tomatoes, yet it doesn't include ketchup and juice, figures for which also skyrocketed under war demands. The old "love apple" of colonial days that was suspected of lethal possibilities has really come into its own.

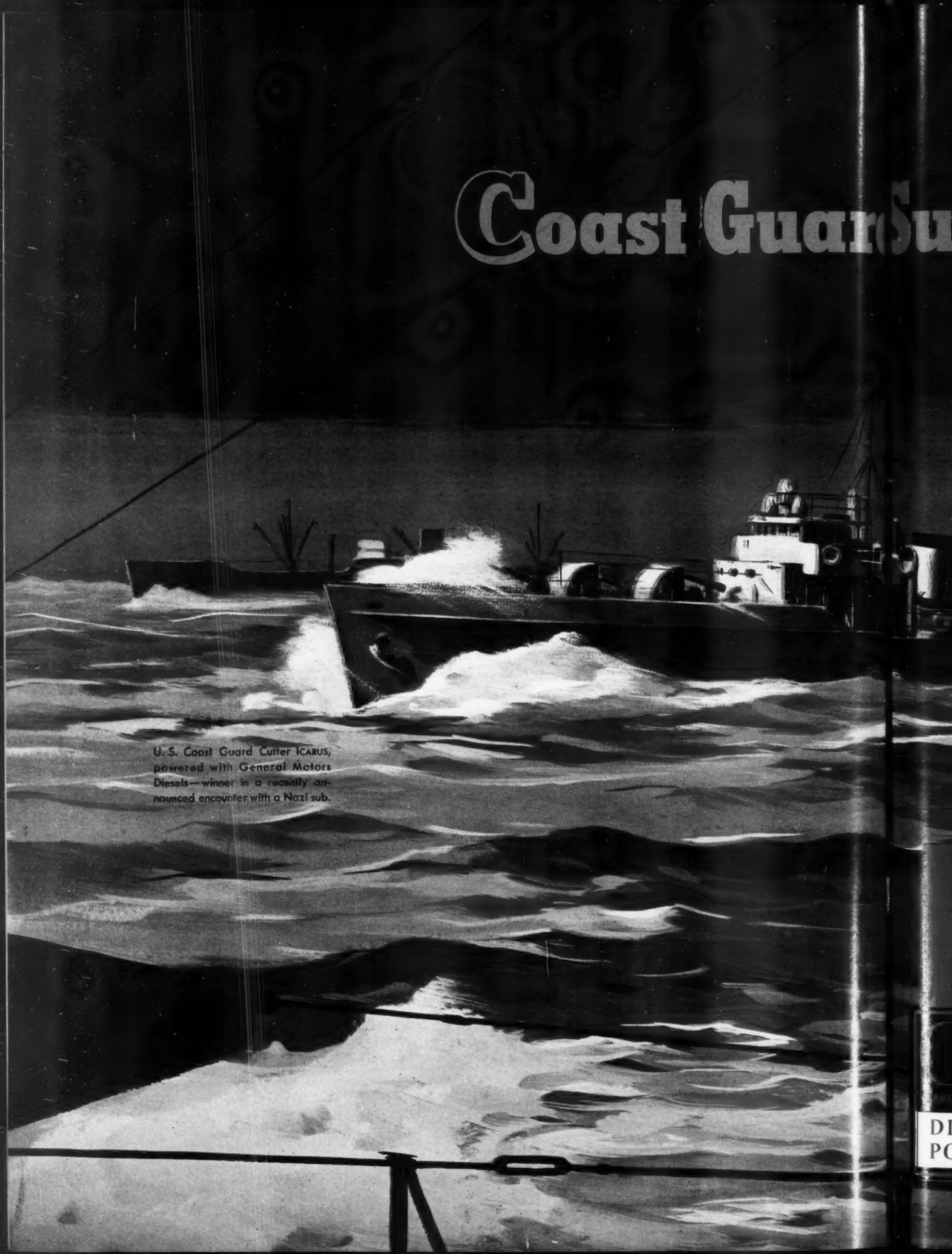
The fact is that on the production end, there is no limit to where the California farmer can take tomato production. The problem is to find labor to harvest them. For the mechanization of the farming end makes tomatoes as easy to raise as any other row crop—corn, cotton, potatoes, beans, etc. The western farmer has been Diesel-izing his crops since late in 1931 when he bought the first Caterpillar Diesel tractor offered the public. There was only a trickle of them through 1932 and 1933, but they were taking all they could get and yelling for more. Your Old Reporter recalls coming back to the Coast in 1934 and driving up the San Joaquin Valley as new Diesel tractors began appearing in bunches. You couldn't get out of sight of them from then on in the big farming areas where there was work to be done. They were the answer to the farmer's prayers for something to help him cut his way out of the depression and get back to profit. So, he was well equipped with Diesels when war broke and the Bright Young Men at Washington began putting hobbles on the farmer to make it hard for him to do his war job. One of these hobbles that has hit the Western farmer worst is the inability to buy any more Diesel tractors. The old ones are all being used to their capacity; they are more precious than gold mines these war days.

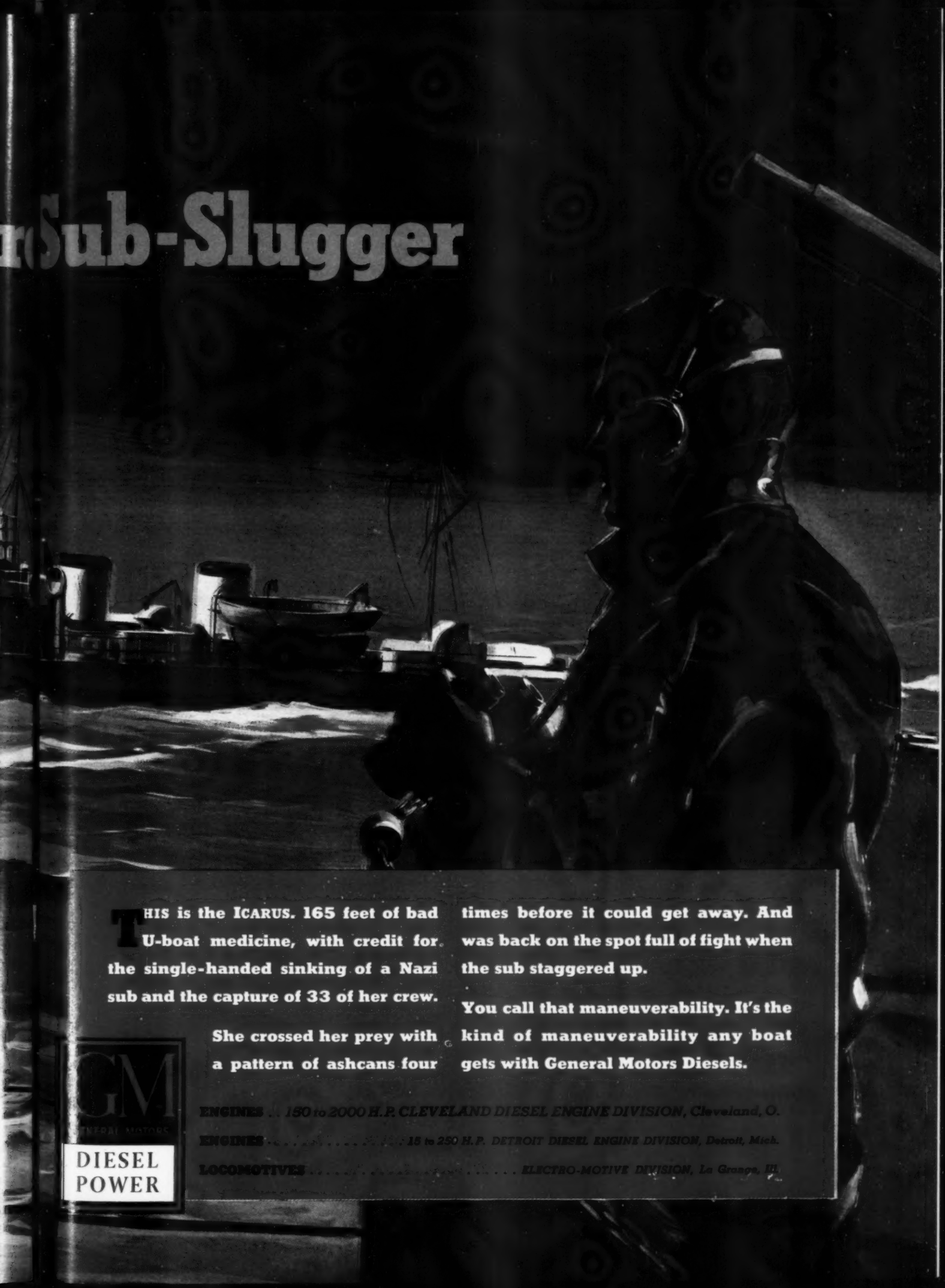
One illustration shows a super tomato transplanter built and used in the Santa Clara Valley by Diesel tractor farmers who went in for tomatoes on a big scale the past two seasons. They are easily handled by the Diesel tractors, though 650 gallon water tanks are built on each transplanter to water the tomato plants as set. Two men ride each transplanter to feed the plants into the machine, while a driver operates the tractor and a fourth man hauls water. The outfits each set around 20,000 plants a day. Five such outfits are at work this 1943 season, priorities preventing the building of more of such food producing machines. Tracktype tractors, of course, can't be had as new units, so the old ones carry on.

This contraption, with a two man crew and a Diesel tractor to pull it, transplants 20,000 tomato plants a day; each plant gets a pint of water from the 650 gallon tank.

Another view of the supergiant tomato transplanter and its motive power, a Caterpillar Diesel tractor.




Coast Guar
U. S. Coast Guard Cutter ICARUS, powered with General Motors Diesels—winner in a recently announced encounter with a Nazi sub.



THIS is the ICARUS. 165 feet of bad U-boat medicine, with credit for the single-handed sinking of a Nazi sub and the capture of 33 of her crew.

She crossed her prey with a pattern of ashcans four times before it could get away. And was back on the spot full of fight when the sub staggered up.

You call that maneuverability. It's the kind of maneuverability any boat gets with General Motors Diesels.

GM
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ENGINES . . 150 to 2000 H.P. CLEVELAND DIESEL ENGINE DIVISION, Cleveland, O.

ENGINES . . . . . 15 to 250 H.P. DETROIT DIESEL ENGINE DIVISION, Detroit, Mich.

LOCOMOTIVES . . . . . ELECTRO-MOTIVE DIVISION, La Grange, Ill.

The Kenyon, Minnesota municipal power plant.

TEN DIESEL YEARS AT KENYON, MINNESOTA

By WM. H. GOTTLIEB

IN 10 years, the Kenyon, Minnesota, municipal Diesel generating plant has more than doubled its capacity, increased its production by five times and earned a net profit of more than $140,000. At the same time, rates to consumers have been reduced substantially. There has never been an engine failure and general service is of so high a level that the town's electric clocks have not stopped for one second in more than five years. That is the achievement of one decade in a community of less than 1,400 population.

To secure lower rates and better service for its citizens, Kenyon decided upon a municipal power plant and installed in 1932 three four-cycle, mechanical-injection, Worthington Diesels. The main load was to be carried by two 4-cylinder, 13¼ x 17½-in., engines rated at 300-hp. each at 327 rpm. For the small night load, a 6-cylinder, 125-hp. engine was provided.

Like so many small towns where high utility rates had discouraged consumption, Kenyon started with a small, inefficient load which averaged only 50 per cent of operating engine capacity. Total production the first year was just 256,880 kilowatt hours. Like so many small towns which take upon themselves the provision of light and power for their citizens, Kenyon's first step was a reduction in rates and the result was a rapid expansion of consumption. Plant production the second year was 619,740 kw.hrs. and the steady rise continued, topping the million mark in 1939. Production for the fiscal year ending March 1st, 1942, reached the all time high of 1,305,005 kilowatt hours.

In the course of years, it became apparent that the plant would require considerable expansion. Even the night load had outgrown the 125-hp. engine. To meet expanding requirements, Kenyon installed in September 1941, a 750-hp., 6-cylinder, Worthington Diesel of 16 in. bore and 20 in. stroke developing its rated horsepower at 327 rpm. The 125-hp. unit was removed and sold to the University of Connecticut. The new engine increased plant capacity of 1350-hp., to more than double its original size. Each of the 300-hp. units drives directly a 200 kw., 3-phase, 60-cycle, 2400 volt, General Electric generator with 8 kw. direct-connected exciter. The new engine is direct-connected to a 521 kw., 2400 volt, Electric Machinery generator with a 15 kw. V-belted exciter. Kenyon has a sizeable industrial load supplying a creamery which makes powdered milk for military and Lend-Lease use, a grain mill, two locker plants and a canning plant. As a result it is necessary to run either the 750-hp. engine or both 300-hp. units throughout the day. City water pumping is now done at night reducing the day peaks and providing a good load for a 300-hp. Diesel at night.

In Kenyon's Diesel experience, improvement has gone hand in hand with expansion. Fuel consumption has been cut from year to year so that now the return for fuel is consistently above 11 kw.hrs. per gallon and frequently above 12. The plant showed a profit from the first although small production meant a high unit cost of overhead. With expanding activity, the cost per kw.hr. of such fixed charges as labor, interest and depreciation has dropped sharply and plant profits have shown a corresponding rise. In 1932, the total expenditure of the electrical department, including plant operation, distribution and business office, was $6,890.99 or 2.68 cents per kw.hr. Net profit for the year was $2,618.77. In 1941, the corresponding expenditure was $20,991.40 or 1.61 cents per kw.hr. The net profit was $21,840.57.

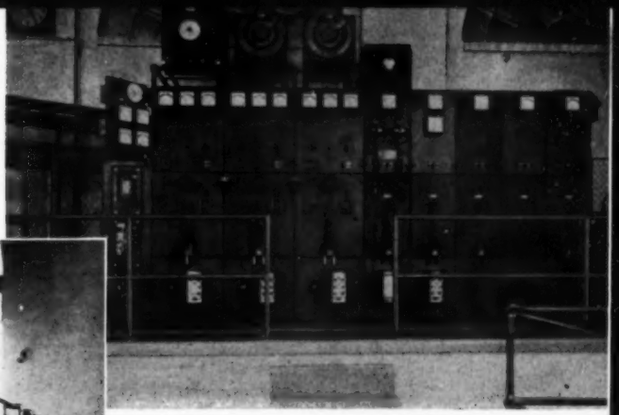
Total net profits for the 10 years was $141,280.25, a sum sufficient to pay the entire cost of the expanded plant with a comfortable margin for other civic projects. Kenyon has 1942 and 1943 profits earmarked for purchase of War Bonds. Eventually, plant profits will go for further rate reductions and tax reductions and more public improvements such as the new white way which makes Main Street one of the best lighted thoroughfares in Minnesota. Table 1 gives the full picture of production and profit expansion for 10 years. No table, however, can give the picture of unfailing service that this plant has achieved. There have been no breakdowns and no major repairs. Although each 300-hp. engine runs nearly 5,000 hours a year, all the Diesels are operating with their original valves, bearings and cylinder liners. Total cost of maintenance for the past year was under $150.

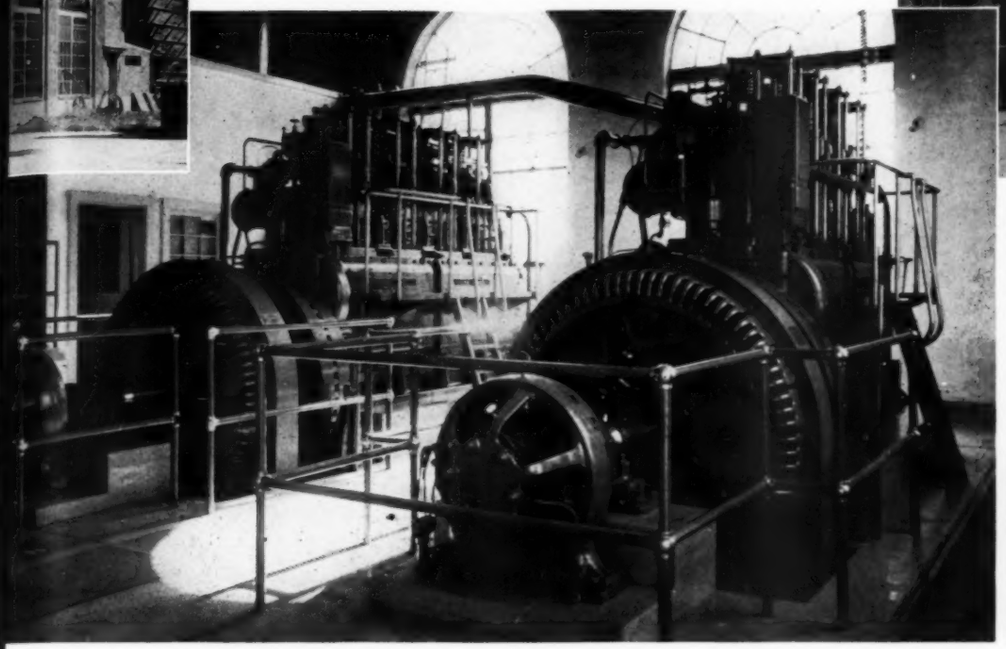
The plant's success in boosting efficiency while keeping maintenance costs low is attributable in large measure to choice and arrangement of prime movers and accessory equipment. The engines are protected against impurities in fuel and lube and against hardness in the cooling water. Each of the Diesels has a pressure lubricating system which delivers a full supply of Sinclair Rubilene to the bearings. In each circuit is a duplex Cuno filter and a Ross oil cooler. The plant has a Hilco activated clay purifier arranged to cut in for continuous operation on each engine. The purifier is used with

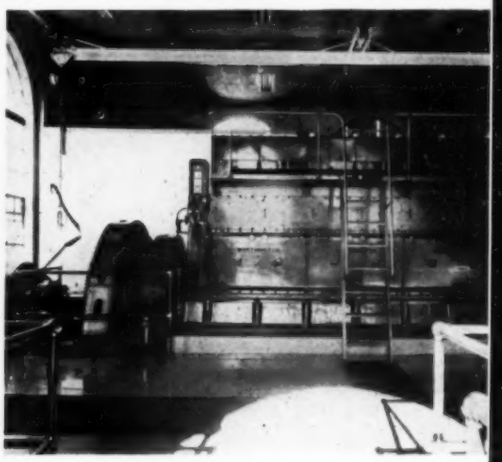
KENYON, MINNESOTA
TABLE I

Year	Kw. Hrs. Generated	Fuel Consumed	Kw. Hrs. per Gal. Fuel	Lube Consumed	Total Expendit.	Receipts	Net Profit
1932	256,880	26,151	9.82	230	$6,890.99	$9,509.76	$2,618.77
1933	619,740	62,997	9.84	312.5	$14,628.22	$23,615.98	$8,987.76
1934	645,490	66,580	9.69	413.5	$15,493.13	$25,614.84	$10,121.71
1935	711,350	72,596	9.81	706	$16,348.72	$29,018.23	$12,669.51
1936	794,200	77,950	10.19	586.5	$17,592.97	$31,514.66	$13,921.69
1937	906,060	86,623	10.46	443.25	$18,251.38	$35,361.85	$17,110.47
1938	983,220	93,021	10.57	496.25	$18,246.72	$36,727.49	$18,480.77
1939	1,085,050	100,002	10.85	1,600	$17,582.79	$37,481.31	$19,898.52
1940	1,183,580	105,534	11.22	1,556	$18,801.00	$39,910.50	$21,109.50
1941	1,305,005	117,005	11.15	1,776	$20,991.40	$42,831.97	$21,840.57
Total	8,490,275	808,259		8,120	$164,827.32	$311,584.59	$146,757.27

Below: Veteran units in the Kenyon plant are two 300 hp. Worthington Diesels installed in 1932. Lower right: Latest addition, a 750 hp. Worthington Diesel installed in 1941. Right: The GE-built and equipped switchboard includes three Westinghouse Silverstat voltage regulators.







the engine running and, if two are in operation, is switched back and forth from one to the other. Cylinders are supplied with lube by Manzel force-feed lubricators. Success of the lubricating system is evidenced by the small wear of bearings and liners. Not only are the original parts still in use, but the same size piston rings fit well. The plant has never had a stuck ring.

For fuel, the Diesels consume a 25 gravity crude oil supplied in tank car lots. A motor-driven Worthington gear pump at the Northwestern Railroad Depot, a block from the plant, unloads fuel and delivers it to a 15,000 gallon and a 23,000 gallon storage tank above ground near the plant. A second motor-driven Worthington gear pump transfers fuel through individual Worthington-Gamon meters to the three 180-gallon elevated day tanks inside the engine room. From the day tanks fuel flows to the engines by gravity through Cuno filters. The quantity of fuel injected in each charge is controlled by Woodward governors.

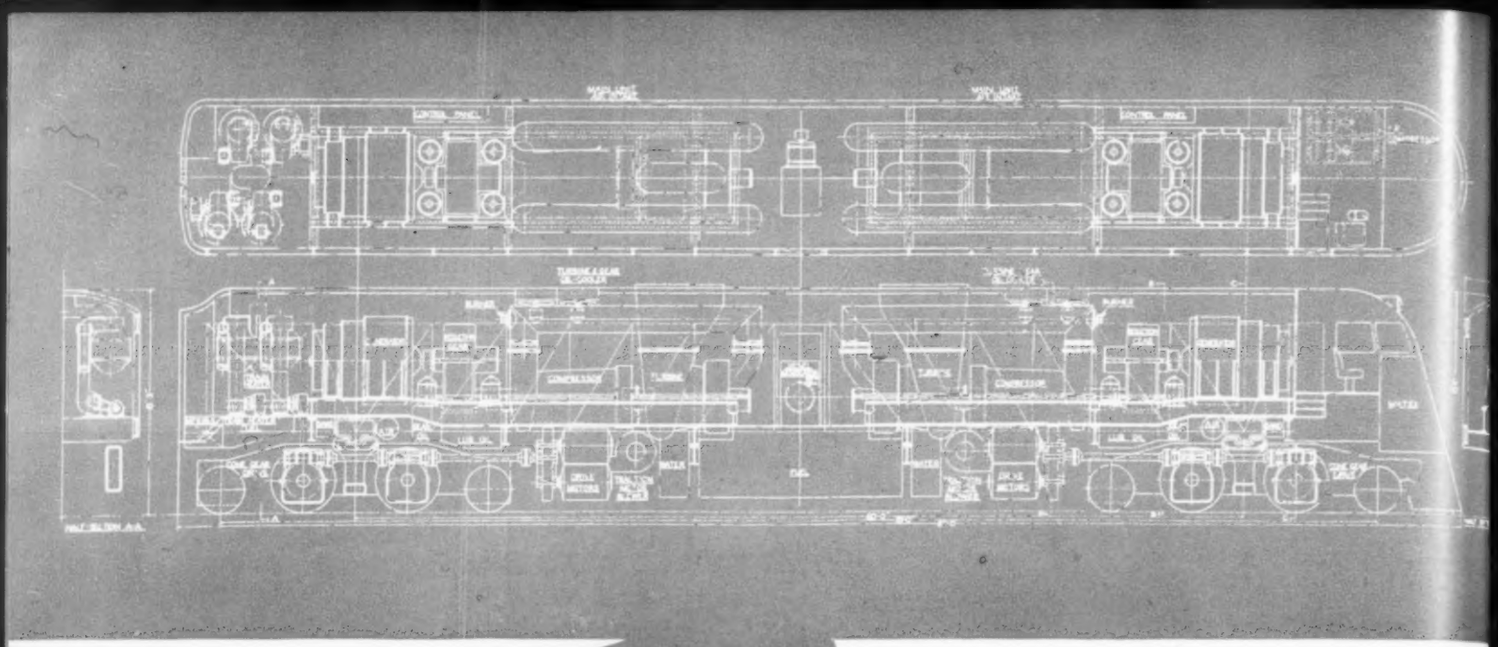
All three engines are supplied with cooling water from a common header with water circulated only through the engine jackets and two Condenser Service heat exchangers. City water treated in a Crane softener is used for makeup. Raw water is pumped through the exchangers and over a Pritchard cooling tower.

The plant makes use of waste heat to heat the building in cold weather. Jacket water is put through unit heaters both in the engine room and in the office. Exhaust gases vent through vertical Burgess snubbers outside the plant and the two snubbers for the 300-hp. engines are housed in brick with fans to carry warm air into the building when needed. All engine air is cleaned by American filters for the old engines and an Air Maze oil bath filter and silencer for the new unit.

There are three regular operators working eight-hour rotating shifts, one extra man who serves as mechanic and relief operator, and a lineman who can be called on to serve as an operator in case of need. There is always a qualified man on duty at the plant and he keeps a close check on water and lube temperatures and pressures utilizing Motoco thermometers and Ashcroft American pressure gauges. As a safety measure the plant has a complete alarm system which warns of high jacket temperature, high or low water pressure and low lube pressure. The new engine has a device which shuts it down if lube pressure fails. The nine-panel General Electric switchboard is equipped with totalizing kilowatt-hour meters, a recording watt meter, a synchroscope, oil circuit breakers and three Westinghouse Silverstat voltage regulators. Engines are started by compressed air provided by two Worthington compressors, one direct-connected to a Novo gasoline engine and one V-belted to a 5-hp. General Electric motor. Maintenance work is facilitated by such devices as a Bosch nozzle tester and a valve handler as well as a two-ton Wright hoist on a traveling beam that can reach any part of the plant.

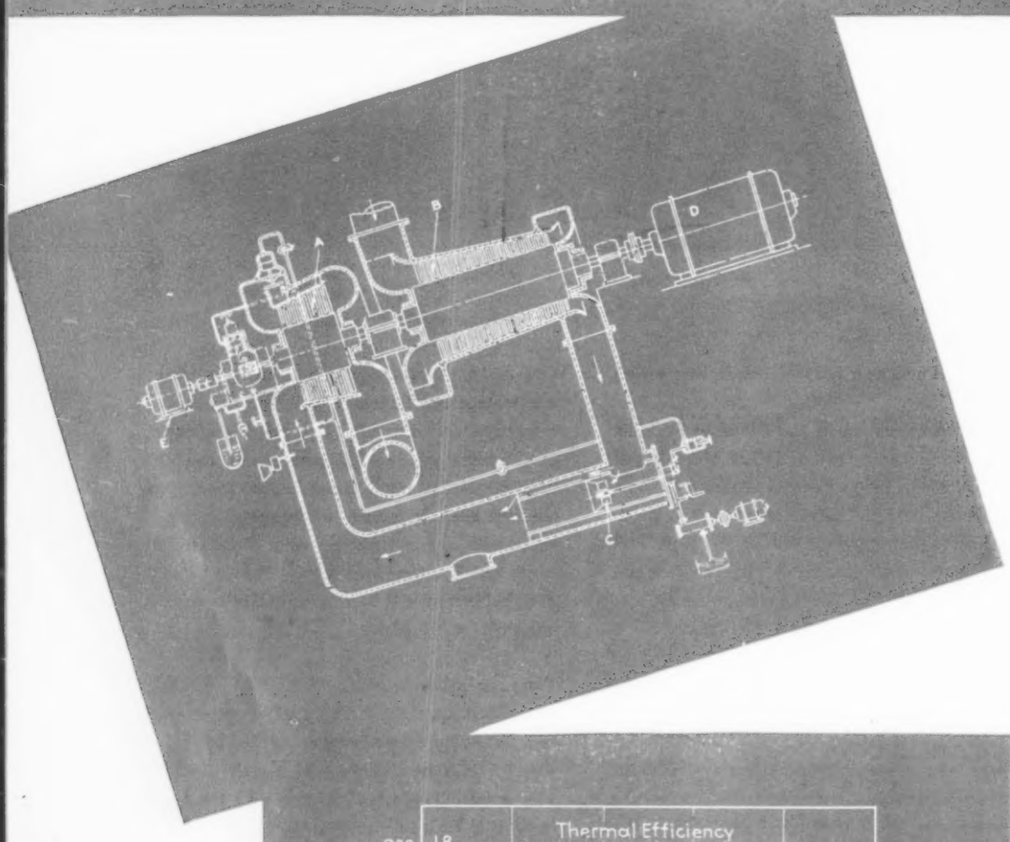
Plant operation is directed by C. C. Dudley, superintendent, under the general supervision of a three-man Commission appointed by Mayor Wilkins Watson and the City Council for two-year terms. Present membership of the Commission is Helge Berg, chairman, Vernon Floyd and Albert Hilstad.

The citizens of Kenyon decided upon a municipal Diesel plant ten years ago to obtain better service at lower rates. This was accomplished immediately and the accomplishment has been maintained and augmented through ten years of operation. Kenyon has found that it bought a better proposition than it bargained for—a money making plant that has more than paid for itself, that has financed public improvement, and that promises still lower rates and lower taxes in the second decade of Diesel service.

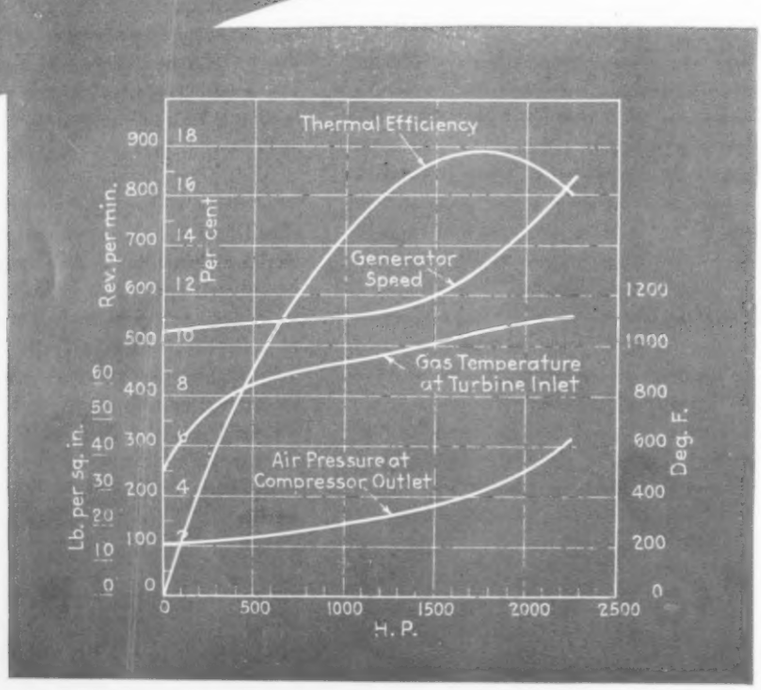


Illustrations courtesy Allis Chalmers Mfg. Co.

Above: Plan and side elevation of a 4500 hp. Gas Turbine locomotive.



Left: Diagrammatic arrangement of a modern gas turbine–axial compressor unit. A five stage reaction type gas turbine A is direct connected to a fifteen stage axial compressor B. Atmospheric air enters the compressor where its pressure is raised. Part of the air discharged from the compressor is used to support combustion in the oil burner C. The balance of air is bypassed around the burner to cool the products to combustion to a satisfactory turbine inlet temperature. The mixture of air and combustion products is expanded through the turbine and is thence exhausted to the atmosphere. The turbine develops more power than is required by the compressor–the excess power being absorbed by the generator D. The starting motor E is used to bring the unit up to ¼ speed at which point the turbine starts developing sufficient power to drive the compressor.



"WITH two major obstacles out of the way—developing a compressor of high enough efficiency and metals to withstand 1000°F.—American progress (in gas turbine design and construction*) gains momentum . . ." says Dr. J. T. Rettaliata, of the Steam Turbine Department, Allis-Chalmers Mfg. Co.

* *Author's parentheses*

The gas turbine in its present state is essentially an internal combustion machine. Its principal elements consist of a fuel burning chamber, an axial compressor, a reaction-type turbine and a starting engine or motor. Its operation is continuous. Receiving air from the atmosphere, the compressor delivers it at 30 to 50 psi. to the combustion chamber where fuel is introduced and the mixture burns. The products of combustion then expand through

THE GAS TURBINE WHAT IS IT?

By WILBUR W. YOUNG

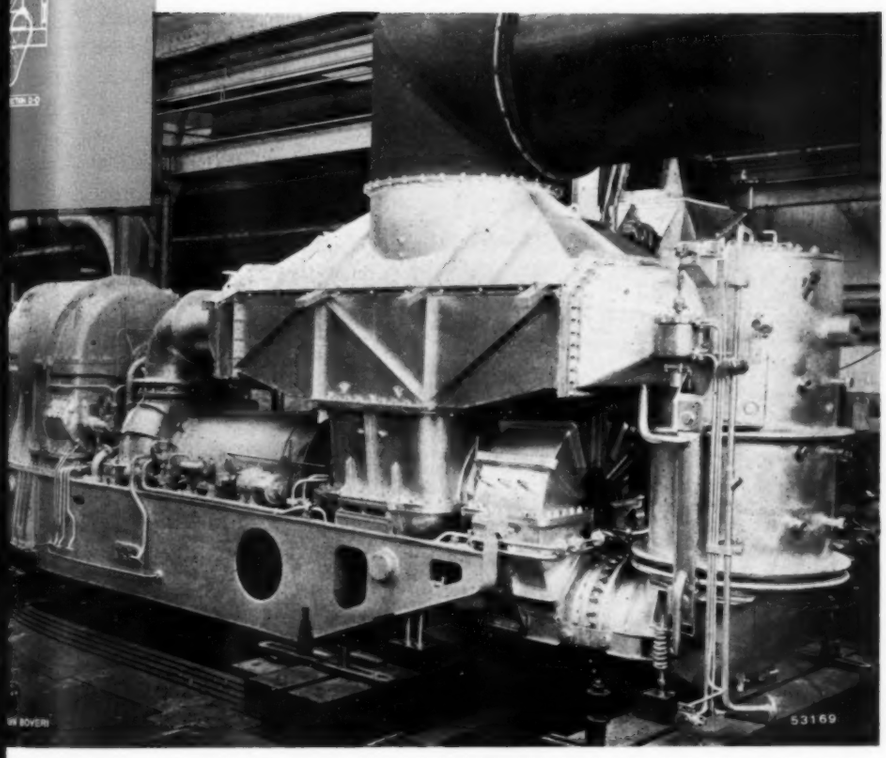


Photo courtesy Paul R. Sidler, resident engineer, Brown Boveri.

Shop view of a Brown Boveri gas turbine generating unit.

the turbine and from thence are exhausted. Power developed by the turbine is in excess of that required by the compressor, the surplus being available for useful work. The thermodynamics of this interesting heat engine are beyond the intent and scope of this article but for those who wish to delve further it is noted here that the combustion gas turbine operates on the Brayton cycle consisting of two isentropic and two isobaric lines.

Current designs place the turbine and compressor on a common shaft with starter and generator on extensions of the shaft with suitable clutches and couplings. The gas turbine is thus seen to be a simple machine, shorn of such incumberances as oil and water cooling facilities, transfer pumps and filters, auxiliary compressors, boilers and boiler room accessories, in fact it is a self contained prime mover which will operate continuously and independently of external auxiliaries so long as fuel is supplied. And it will function on low priced bunker-C oil, gas and, it has been hinted that powdered coal is a possible fuel.

The modern gas turbine is based on the original design by John Barber who obtained an English patent in 1791. Barber's machine employed the continuous combustion principle and developed its power from high velocity combustion gas acting on simple impulse-type turbine blading. The earliest machines developed only enough power to drive the compressor leaving no power available for useful work. The long lapse of time between its original inception and the first workable design, that of Dr. Adolph Meyer for Brown Boveri Co. in 1930, was fraught with metallurgical and aerodynamic difficulties. For it must be remembered that while operating pressures in the gas turbine are not high, temperatures and velocities are however excessive. The development of alloy steels and new airfoil sections in later years have rendered the gas turbine a feasible, workable and competitively efficient machine.

While all current data point to an overall efficiency of 18% to 20% which on the face of it is not formidable by comparison with Diesel's 30 to 35%, it is noted with due respect that Allis-Chalmers recently advertised gas turbine efficiencies (in the future) equal to or better than Diesels', but with the low maintenance and simple lubrication of steam turbines.

Some twenty-seven gas turbine installations have already been made in this country, the first eight of which were installed by Brown Boveri Co., the balance by Allis-Chalmers all as auxiliaries to the well known Houdry gasoline cracking process. Other American concerns who have made their gas turbine production activities known are General Electric, Westinghouse and De Laval. Another probable American manufacturer of gas turbines has as yet made no announcement but it is surmised that he will make a worthwhile contribution to the art. Brown Boveri Co., licensor of Allis-Chalmers, has installed several refinery units as well as a widely publicized locomotive power plant and the 4000 kw. bombproof, standby generating plant for the city of Neuchatel, Switzerland.

It appears that the gas turbine has or is about to have what it takes to match currently available prime mover efficiencies with considerable edge on installation cost and economy of space. Marine, land and air transportation seem to present excellent fields for the extension of its use. Since it requires no water—there are some few localities where that feature may render it highly desirable for central station and industrial use. In addition to proven Diesel efficiency and high availability which this newly developed prime mover only matches or promises to match there remain at present the space and weight saving qualities, lower installation costs and camalistic features to recommend the gas turbine as a runner-up to Diesels. There are indications, however, pointing to fairly definable horsepower brackets, particularly in marine applications, within which the gas turbine, in its present form, and Diesels may prove to be essentially non-competitive. Further developments on this subject will appear in an early issue of DIESEL PROGRESS.

DETROIT DIESEL DIVISION ANNOUNCES THE "QUAD"

A NEW technique of engine combination by which horsepower delivery to a single propeller shaft is increased four-fold with important savings in weight and space was recently announced by the Detroit Diesel Engine Division of General Motors Corporation with U. S. Navy approval.

The new power plant, in production for several months and being widely used in various landing barges of the United States Navy, is known as the Quad. The basic unit is the Series 71 Two-Cycle General Motors Diesel engine, which before the involvement of the United States in World War II, was widely used on American farms, highways, and in the work of peace time construction projects. To meet the higher horsepower requirements of war, General Motors, in cooperation with Navy engineers, devised a method of making these engines work in combination, which, despite its simplicity, is one of the unique engineering developments to come out of the war to date.

The Quad, new Diesel plant for various U. S. Navy landing barges developed by Detroit Diesel Engine Division of General Motors.

The Quad consists of four standard six-cylinder General Motors Two-Cycle Diesel engines geared to a common propeller shaft in such a manner that the assembly occupies relatively little space, permitting greater capacity for troops, tanks, vehicles or other cargo. The basic engines are identical with many thousands of the same model manufactured by Detroit Diesel for the smaller landing boats of the Navy and Army, and widely used in tanks, tractors, trucks and stationary and portable power installations. Thousands are in service overseas in these other installations, contributing to wide availability of replacement parts for the Quad.

Cruising range is increased by the flexibility of the engine arrangement coupled with the use of the General Motors controllable pitch propeller. Use of this propeller also eliminates the expenditure of critical materials in such equipment as reduction and reverse gears.

Much of the space economy in the Quad results from the basic design of the Series 71 General Motors Diesel engine which permits placing blower, starting motor, generator and other accessories on either side of the engine and rotation of the crankshaft in either direction. By placing accessories on the "out" sides the engines in each pair in the Quad can be located exceptionally close to each other. These unique design features permit mounting the two pairs of engines on the base in such a way that all four engines are attached to a gear box located centrally; thus the power is geared to the propeller shaft beneath the center of the entire assembly. Controls are located at one side of the centralized gear box.

The gear, clutch, propeller shaft and controllable pitch propeller are manufactured by Electro-Motive Division of General Motors. Detroit Diesel manufactures the engines and assembles the complete power plant.

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STARTERS-GENERATORS ★ BATTERIES ★ FOR DIESELS . . .

AUTO-LITE means AUTO-LIFE

AUTO-LITE engineers were among the first to start internal combustion engines electrically. The dependability of this equipment has been an important factor in making Auto-Lite the world's largest independent manufacturer of automotive electrical equipment.

The knowledge and experience gained through 29 years in meeting automotive electrical problems has proved of tremendous value in the development of electrical systems for Diesel requirements.

Auto-Lite systems for Diesels are complete from generator to voltage control to battery to starter. These units are part of a long list of items Auto-Lite's 26 great manufacturing divisions are producing for America's Armed Forces on land, sea and in the air. Diesel manufacturers are invited to consult us on problems involving electrical cranking or generating equipment.

THE ELECTRIC AUTO-LITE COMPANY

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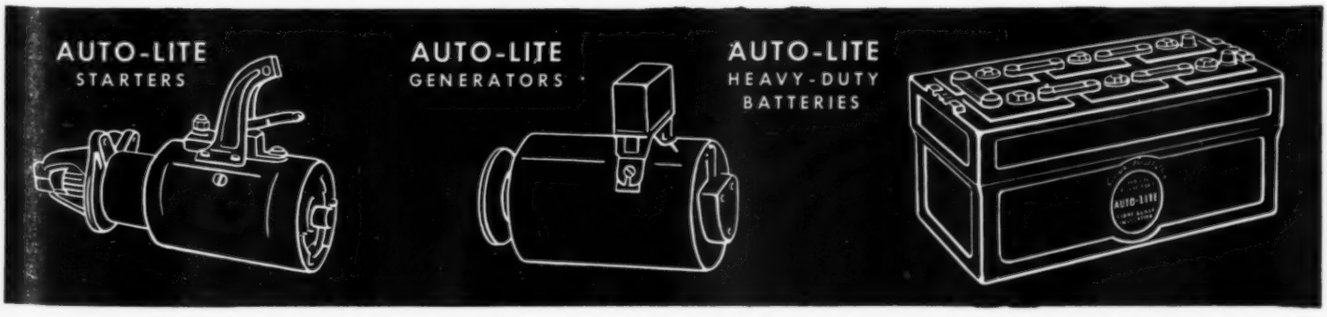

"SCAVENGING PUMPS AND COMPRESSORS"

Part 1. General Care.

By R. L. GREGORY*

NO piece of equipment on an air injection engine, requires more careful inspection and maintenance than the scavenging pump and compressor, especially where they are an integral part of the unit and operated directly from the crank shaft. Good operation of an air injection unit, depends a great deal on maintaining the proper stages of compression and in so doing, the valves and seats are subjected to considerable strains and stress.

Any plant having such type of equipment should have spare intake and discharge valves on hand, all in good mechanical order, because one never knows at what moment a valve may break or become defective in operation due to breakage of valve springs, the valves themselves, or chipping and pitting of the valve seats which causes leakage from one stage to another. A set of conditioned valves ready to install at a moment's notice will eliminate outage time in such an emergency breakdown.

Frequent inspection and changing of both suction and discharge valves in this type of equipment is good maintenance practice and insurance against forced outage, even though they appear to be functioning properly. Under present conditions of securing metal for the manufacture of valves, springs, valve seats, etc., there is a possibility that these parts will not run as uniform in tensile strength and metallic composition as they did in the prewar period. We have noted in shipments of replacement parts of this nature that valves of the same manufacture vary in hardness and consequently vary in the amount of service which we can expect from them.

The longevity of such parts depends on several conditions, such as the composition of the material from which they are manufactured, the conditions of the compressor in which they are used as to lubricant, carbon deposits encountered, etc., and last but not least, the care and maintenance given them.

In order to have suction or discharge valves work properly, they first of all must be kept clean and receive the proper amount of lubricant. Secondly the valves must seat perfectly on the valve seats at all points of contact. Consequently the last point goes hand in hand with the first, since no valve can be expected to seat perfectly in a cage which is full of carbon residue or other foreign matter. If you have had much to do with such type of equipment you have undoubtedly noticed from time to time a clicking noise in these valves when in operation. This is frequently heard when a hard piece of carbon, scale or even a small piece of a broken spring passes through from one stage to another and becomes lodged upon the valve seat. When this occurs it will frequently carry on through but while being lodged on the valve seat will cause the valve to make poor contact with the seat, causing leakage at that particular point.

Occasionally these pieces of foreign matter become permanently imbedded in the valve seats or on the surface of the valves themselves and after a short period of time cause the thin valve disc to crack or often break and forcing a shut down for repairs.

Such instances are not the rule, but do occur off and on. The best way to avoid such occurrences is by frequent inspection and changing of these parts.

Considerable quantities of heat are generated in the process of air compression, especially in the higher stages of compression. This heat has a direct effect upon the metal of the various parts, especially upon the springs above the valves, which oftimes become crystalized and break off. When this occurs, the effectiveness of the valve becomes lessened and if it does not entirely disrupt the functioning of the valve at once it eventually will.

The thin valve discs are often distorted by heat and the strains under which they operate, and because of this do not make perfect contact with the valve seats at all points, thus lessening their effectiveness in operation. This situation can also be overcome by thorough inspection and proper maintenance.

The frequency of these inspections and the changing of these valves depends a great deal upon local operating conditions as well as upon the type and material construction of the valves. If your unit is well loaded requiring a maximum of blast pressure, and consequently a maximum amount of compression in all three stages of the compressor, low intermediate and high, the inspections should be more frequent and changes of this equipment made oftener than in cases where the load is at only partial rating of the unit.

The cooling jackets around the various stages should be well cleaned and kept so in order to eliminate scaling and the insulating effect of that scaling. Frequent lead wire clearances should be taken at the time of these inspections, to insure the proper clearances between the piston heads and the casing. These can be easily secured by removing valves from the various stages, placing the lead wire upon the piston heads and by use of the barring mechanism turn the unit over slowly past top position. Then remove the lead wire and by means of a micrometer mike up these clearances and ascertain whether they are in proper relation to the manufacturer's recommendations.

These clearances are all important in the proper function of the scavenging pump and compressor and should be maintained at the proper spacing at all times. Due to the construction of such types of compressors, working directly off the crank shaft, there is bound to be some wear in the up and down motion, hence the required checking of this travel and these clearances.

Next month we will further discuss the maintenance of these valves using photographs and drawings to illustrate the method and equipment required for properly lapping in valves and valve seats.

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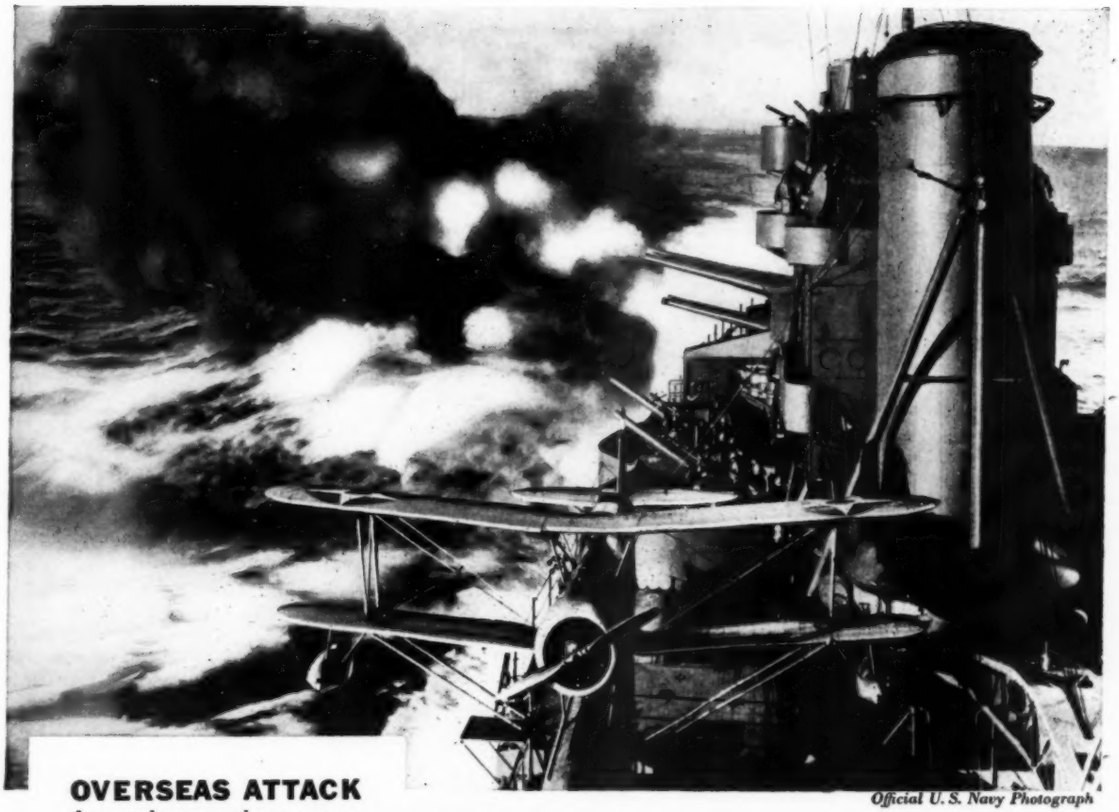
* *Chief Engineer, Municipal Water and Light Plant, Hillsdale, Michigan.*

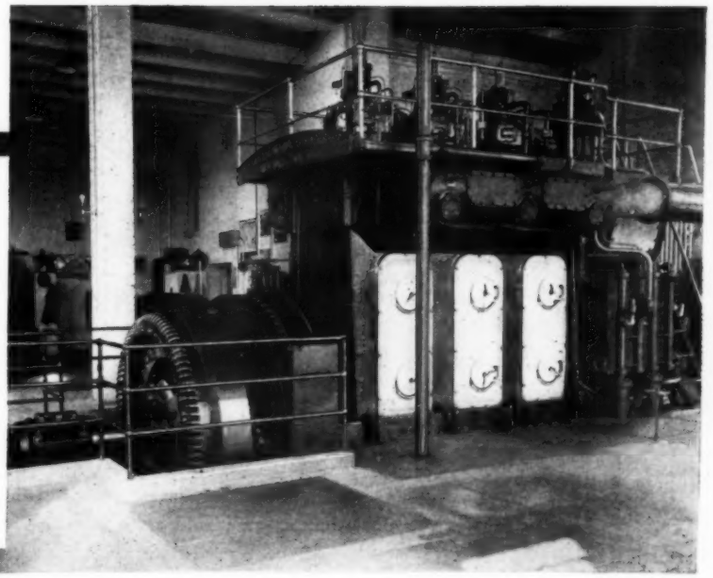


Official U. S. Navy Photograph

OVERSEAS ATTACK demands powerhouse support. To keep *DIESEL* engines in continuous heavy duty operation use . . .

. . . . . SINCLAIR RUBILENE OILS. Rubilenes insure compression seal that delivers full engine output. These oils promote clean, cool running with negligible wear on rings and liners.

Write for "The Service Factor"—a free publication devoted to the solution of lubricating problems.



SINCLAIR INDUSTRIAL OILS

FOR FULL INFORMATION OR LUBRICATION COUNSEL WRITE SINCLAIR REFINING COMPANY (INC.), 630 FIFTH AVENUE, NEW YORK CITY

Exchange Your Diesel Maintenance Ideas

Conducted by R. L. GREGORY

Editor's Note: In this department we provide a meeting place where Diesel and Gas engine operators may exchange mutually helpful maintenance experiences to keep our engines in top condition. Mr. Geogory edits your material and adds constructive suggestions from his own wide experience. This is your department—mail your contributions direct to DIESEL PROGRESS.

Faulty Gaskets Can Cause Trouble

Contributed by

MR. C. JENNINGS

Marshall, Michigan

"WE have installed in our plant, two old-type VE Diesels which have been in operation for several years. Some time ago we ran into trouble with these units. The scavenging pump and first stage of the compressor are driven by one crank, while the high pressure and intermediate stages are driven from a second crank.

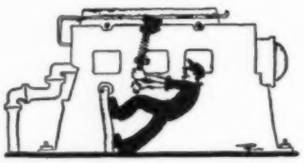
"When trouble developed with this equipment we made an investigation and found that the copper gasket under the low pressure head was of the wrong size and had consequently been improperly installed. This fact allowed water to get into the low pressure cylinder, destroying lubrication and causing the piston to seize.

"The piston was badly scored and elongated, cylinder wall scored, scavenging pump rod and parting bolts were stretched ½" and the shoulder on the rod was driven up into the cast iron disc about ½". We were able to get the cylinder honed by a piston service company and a local machinist trued up the piston by properly grinding.

"A new disc, rod and parting bolts had to be secured from the manufacturer, and we made a new copper gasket of the proper size and dimensions. When the unit was again assembled it worked satisfactorally and has continued to do so.

"We then investigated the second unit, removing the low pressure head and much to our surprise found that the same condition existed as regarding the wrong gasket. However we had experienced no trouble with this unit, and thus averted trouble with it. However it is still a mystery to the writer, why trouble had not been encountered previously since the unit was in operation for some time after the wrong gaskets were installed."

In all probability the gaskets which later proved defective and caused this trouble, held for a period of time even though they were of incorrect size. But constant use of the unit probably pounded them out to the point where they began to leak and allowed water to get into the low pressure cylinder. The above instance shows the necessity of securing the proper gasket for places where gaskets are necessary, and there are many of them on most Diesel Units. This is a very vital point especially on air compressors as many of the fits are close and gaskets must fit properly in order to eliminate leakage and resultant troubles such as the above.



An Emergency Repair

Contributed by

R. E. GREGORY

OFTEN in the operation of power plant equipment, maintenance crews are forced to use unusual methods and materials in making emergency repairs. Some time ago we wanted to inspect the connection between the high pressure piston and low pressure piston of an air compressor at the point where the castle nut holds the high pressure piston in position.

In order to make this inspection it was necessary to lift the high pressure cylinder, breaking the connection between the high pressure cylinder and low pressure cylinder, after removing the parting bolts. In performing this operation although care was used, we tore the ⅜" tubular rubber gasket which forms the joint between the two cylinders.

When it came to reassembly it was discovered that we did not have a new tubular gasket to replace the torn one and as the unit was in demand some sort of a gasket had to be made up. We finally hit upon the idea of taking a piece of duplex rubber covered light cord such as is used in making of extension light cords and which was approximately of the same diameter of the ruined tubular gasket.

This piece of duplex light cord had a coating of good live rubber, and was laid in the gasket groove and the proper measurement taken. The ends were then tapered off for about an inch and a half, and roughed up well with sand paper, glued together with rubber cement, and the joint wound with a heavy linen thread. The groove was then filled with permatex, and this improvised gasket placed in position and a coating of permatex put on the top of the gasket.

The high pressure cylinder was then replaced and the parting bolts drawn down evenly all around and checked. When the unit was put back in operation, the gasket held perfectly and is still in use though the joint has been broken a number of times since. The soft stranded copper wire in the center of the duplex cord added materially to the strength of the gasket and once formed retained its shape. This experience is passed on for what it may be worth to some of our readers who may be caught in the same position as we were.

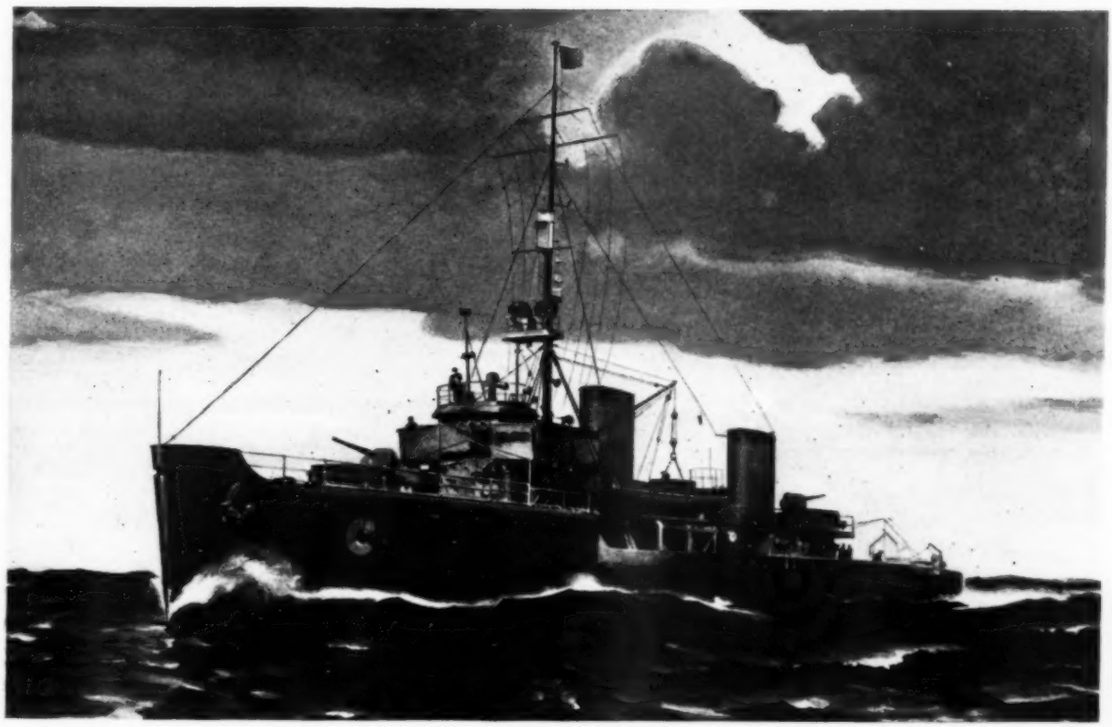
Do You Know?

DO you know that DIESEL PROGRESS pays $5 for each contribution published in this section? Do you know a practical repair or maintenance trick that you would like to pass on to our large interested group of readers? Write your idea up roughly, illustrate it with a sketch or photograph and mail it to DIESEL PROGRESS.

R. L. Gregory

WHAT!

FLUID DRIVE A MINESWEEPER?



U. S. Navy Minesweeper equipped with American Blower Fluid Drives.

UNSUNG HERO of the war—sleek, sturdy, U. S. Navy Minesweeper. In foul weather and fair, these all important craft literally look for trouble in all waters where American warships and merchant ships are exposed to enemy mines.

American Blower Fluid Drives on a minesweeper (as well as on numerous other U. S. Navy craft and cargo vessels) prevent transmission of torsional vibrations and shocks from powerful Diesels to delicate machinery, synchronize multiple engine speeds and permit rapid clutching and de-clutching.

The Navy, Army and Maritime Commission have called on American Blower to build more and more Fluid Drives for war work. Such an assignment fits right in with our engineering background and experience and our complete facilities for manufacturing many and varied types of equipment.

After Victory, when the lights of the world go on again—you'll find Fluid Drives built by American Blower in a wide variety of new and ingenious applications. You'll also find American Blower air handling, dust collecting and mechanical draft equipment cutting costs and contributing in other ways to America's peacetime progress.

Cutaway view of American Blower Fluid Drive. There is no mechanical connection between driving and driven members.

ARMY E NAVY

For excellence in production.

AMERICAN BLOWER

AMERICAN BLOWER CORPORATION, DETROIT, MICHIGAN
CANADIAN SIROCCO COMPANY, LTD., WINDSOR, ONTARIO
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DIESEL ELECTRIC VICTORY MAINTENANCE

By E. E. LACEY*

WITH the steady increase in war-time load and the present scarcity of new equipment, there is only one way to get greater capacity in answer to demands for greater war output. That is, to take advantage of maximum capacity built into present generating equipment. This is a war-time responsibility of all operators and maintenance men. To accomplish this all equipment must have special care, close attention and rigid inspection. It is necessary to take these steps to insure the long life of Diesels and generating equipment, as new machines are hard to get and shut-downs for replacements might cause a delay in production of vital war products.

To get maximum capacity from your generating plant, the following procedure is recommended for adoption and should be followed for the entire operating period of the plant.

1. Investigate your plant lay-out to locate and remove limitations that prevent obtaining full capacity.
2. Readjust operating and maintenance practice to realize maximum output and efficiency.
3. Carry out systematic inspection of units at more frequent intervals to detect and prevent unnecessary loss of wartime output.

The inspection charts shown below were made up to give an indication of the various checks on both mechanical and electrical equipment operating in the power plants. These charts are representative of an average plant, and the various times of inspection may vary somewhat with each particular case.

A successful Diesel maintenance and inspection plan cannot be set up in a plant in a haphazard manner, but should consists of a definite program to be followed by the operating men. Charts listing each specific job are very helpful and indicate to the men definite steps that must be taken by them to insure the proper operation of the plan. In addition to this an operating log giving the time of inspection, the item to be inspected and the result is a means of keeping records of actual work done.

There is probably no one who knows the equipment better than the manufacturer himself. Thus, it is always advisable to obtain from the manufacturer literature on his particular equipment. The manufacturer is always happy to supply this, as it insures better operation of his equipment, and thus a better advertisement for it. Such instructions should be followed rigidly in the maintenance program.

The old saying that "an ounce of prevention is worth a pound of cure" has really been born out in the present emergency. Today this pound of cure can be used to produce many items for our fighting men. World War II has taught us many lessons in the maintenance field that were neglected during our period of abundance. However, these lessons will not be soon forgotten, but will be ones that will stay with us in our new post-war era.

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* Industrial Section, Westinghouse Electric & Mfg. Company.

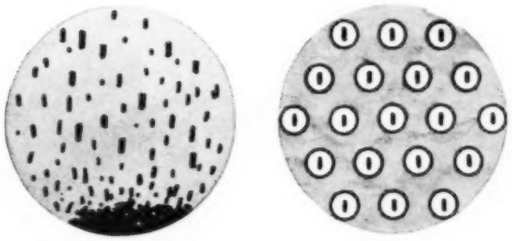
EQUIPMENT	GENERAL HINTS	PRIME MOVER INSPECTION		
		WEEKLY*	MONTHLY*	QUARTERLY*
MECHANICAL				
Fuel System	Purchase only fuel oil recommended by reputable vendor. Clean fuel oil filter and strainers	Check spray valves and reset for recommended pressure	Check fuel pumps Check compression with indicator cards Check combustion pressures to manufacturers recommendations.	Clean out fuel day tanks Clean out fuel supply lines. Check meters Check fuel transfer pumps.
Intake System	See that intake delivers ample supply clean air for combustion. Lack of air reduces capacity	Check intake valve clearances both hot and cold Clean air filters	Remove and grind inlet valves Check inlet valve clearances when reinstalled a - when cold b - when hot c - under maximum load.	Inspect and clean intake silencers - manifold - piping. Remove carbonoy or damaged gaskets.
Exhaust System	See that exhaust system provides for minimum pressure drop High back pressure reduces expansion on power stroke - prevents maximum air intake on suction stroke. Any material variation in recorded cylinder temperatures should be investigated promptly.	Clean out grind out-set valves Check exhaust valve clearances when reinstalled a - when cold b - when hot c - under maximum load	Clean and check pyrometer thermocouples Check pyrometer wiring Drain exhaust silencer	Inspect and clean exhaust manifolds - piping - silencer Renew any leaky or damaged gaskets
Lubricating System	Cleanliness is important Follow manufacturers' instructions as to quality and viscosity of oil and pressure used. Follow manufacturers' instructions on oil filter and purifier if used. Obtain engine manufacturer's advice if additional purifying equipment is added to system. Do not permit oil temperature to exceed that recommended by engine manufacturer without investigating cause and remedying the trouble.	Clean oil filters - strainer clarifiers Check oil lines - tanks for leakage Check all oil lines and connections inside of engine for leaks Inspect condition of crankcase	Clean and refill crankcase Check condition of oil and renew or recondition Inspect lubricating oil pump drive for wear	Clean lubricating oil tanks and piping Clean out cylinder (force feed) lubricators. Refill with clean oil. Clean lines Dismantle and check lubricating oil pump. Clean out oil passages inside engine Clean all coolers
Water System	Soft water if obtainable, should be used throughout cooling system. Maintain cooling tower - evaporative cooler radiator - heat exchanger - clean and free from scale. Make sure water temperature and quantity circulated conforms with engine builder's recommendations.	Check pump packing - water lines - connections for leakage - interior of engine for water leakage.	Clean water passages in engine cylinders - cylinder heads - exhaust manifold. Clean all passages in coolers - heat exchangers - evaporative coolers - cooling tower Clean cooling tower sump-spray pond - nozzles - screens Check condition of pumps - running parts - packing.	Check condition of water passages in engine. If chemical treatment in use check effectiveness for necessary changes.
Starting System	Maintain adequate air supply at all times if air starting is used.	Drain air tanks Check lubrication of air compressor	Check air starting valves on engine Check air starting valves in cylinder heads and reprint Check safety valves - compressor valves	Clean air tanks - inspect condition Blow out all air lines Check condition of starting air compressors Clean crankcase - renew oil.
General	When inspection is completed and unit is back in service check spare parts inventory and reorder necessary parts.	Inspect and oil governor-fuel pump linkage Check bolts and nuts on running gear.	Test all controls - alarm and protective devices Inspect all belt drives	Remove - check and clean all pistons - piston rings oil control rings - piston ring grooves - piston dimensions for wear Check main bearings - crankpin bearings - wristpin bearings - crosshead pin bearings - crosshead shoes and slides. Check crankshaft alignment and inspect crankwebs. Check condition of cylinders (liners) - cylinder dimensions for wear Inspect all gears and drives for clearance and wear. Check piston cooling passages and connection (if pistons liquid-cooled.) Check all springs Test and repair all gauges, thermometers. Clean and inspect governor. Check camshaft bearings - valve gear - valve

EQUIPMENT	GENERAL HINTS	ELECTRICAL INSPECTION		
		WEEKLY*	MONTHLY*	QUARTERLY*
ELECTRICAL				
Generator	Take necessary time for synchronizing to prevent severe stresses on windings when synchronizing out of phase. Avoid operating generator of more than 25 above normal complete voltage without consulting manufacturer Cool ambient air by installing fan - avoid recirculation of warm air. Use correct grade brush as specified by manufacturer Follow manufacturers instruction for lubrication	Check collector rings Check brushes and leads See that ground connections are tight and in good order	Clean brush riggings - ventilating ducts and windings with air (NOT for sleeve bush machines) See that air gap between rotor and stator is uniform See that commutators are smooth and clean Check leads - keep commutators tight from oil and moisture.	Add ball bearing grease to each bearing as generator (Not to oil or sleeve bearing lubricants) Check bearings - oil rings watch out for excessive wear. Check for loose field coils and connections. Check insulation resistance of stator and rotor windings Change polarity of commutating poles (especially if brushes frequently). Increase life of riggings and brushes.
Exciters and Motors	See that machines are loaded according to temperature ratings for continuous operation. Remember you can overload heavily for short periods. In real emergency carry winding temperatures 10°C above normal limit for several weeks. (Insulation life will be reduced).	Inspect bearings and oil rings See that air gap between rotor and stator is uniform Inspect commutator Inspect brushes and leads	Clean with air Check coupling, pinion or pulley alignment. Inspect all cables and connections	Add ball bearing grease to each bearing (Not to sleeve or cast iron bearings)
Switchboards - including Generator Control, Feeder Panels, and Motor Control	Dirt, oil and excessive moisture are very harmful to switchboard equipment	Clean and blow out dirt from starting switches, compensators, and air-circuit breakers. Check for loose connections on wiring parts Keep voltage regulator free from dirt and dust	Test for ground and check ground connections Check for unintentional grounds Inspect contact surfaces and replace worn contacts Check indicating instruments and meters. Check overload devices See that oil is maintained at proper level. Check circuit breaker tripping points.	Check overload relays Check condition of oil Replace damped oil if thick and gummy. Keep leather bellows soft and pliable
Transformers	Overloads up to 100% can be carried for short periods If built-in overload protection is not available add thermal relays and take advantage of added capacity from loading by copper temperature Apply forced oil cooling, forced air cooling or both to increase capacity.	Check temperatures (maximum) full load 80°C., 194°F.		Check transformer oil level (If dirty, refill) Check dielectric strength of oil (If dirty or low test, replace)
Fuses, Lightning Arrestors and Wiring	Protect wires from oil and water Replace all worn wiring, extensions and drop cord Keep all extension drop cords and wiring safe from mechanical injury Plug unused receptacle to prevent sparks from escaping Keep doors tightly closed		Inspect all wiring where vibration is apt to occur Check fuse clips - keep clean and tight. Check connections to prevent over-heating and breakdown Keep fuse and switch cubicle clean	Inspect oil fuses See fuse assembly tight and replace burned out fuses See that refill lugs have some ratings as fuses See that lightning arrester ground connections are correct. (See review of ground connections should not be over five ohms)
Battery	Check battery manufacturer for proper charging rates and care of battery. Check as indicated under motors for battery charging generator and electric starting	Check charge of storage battery (If not fully charged - recharge)		
Conductors	Apply force cooling if overloaded Remove cables from blanketing concrete ducts, in hot flumes or ceilings, and install outside. Use regulators or other devices to correct weak voltage at the end of long lines.	Clean and blow off dirt that accumulates.		
Capacitors (Power Factor Correction)	Check power factor, if low install capacitors to improve. Capacitors will increase capacity of generators, transformers and conductors and reduce line losses and voltage drop.	Clean and blow off dirt with compressed air.		

* SCHEDULE OF INSPECTION MAY VARY. If units are running continuous schedule should be increased. If used for standby only, less frequent inspection is necessary.

How Detergency operates

Cross-sections illustrating oils in use



Non-Detergent

In this type of oil, carbon, oxidation products, dirt, etc., stick to each other and to engine parts . . . deposit in rings, on valves, clog filters, etc.

Detergent

In this type of oil, film *coats* carbon, dirt, etc., prevents particles sticking, holds them in suspension until trapped by filter or drained from engine.

New Detergency for low speed Diesels

Patented ingredient in new Nonpareil H. D. Diesel Oil brings new cleanness and stability . . . reduces wear.

● THE GREAT benefits of detergency (see diagram), so highly valued for high-speed Diesels, are now made generally available for low-speed engines, through the introduction of new Nonpareil H.D. Diesel Oil. This addition to our Nonpareil line brings a step-up in engine cleanness that can be noticed quickly. It not only keeps engines cleaner, but in many cases will remove deposits left by other oils.

The detergency results from the use of an additive which is both a detergent and an oxidation inhibitor. This gives the oil a new high stability, lengthens oil life, and greatly aids in bringing clean engine operation. It also reduces wear.

The combination of all these qualities brings a practical end to troubles from (a) ring-sticking and piston scuffing, (b) excessive sludge deposits, and (c) excessive gum deposits.

Application of Detergent Type Oils. Many engines give clean operation with conventional oils, but where dirty operation cannot be corrected by mechanical adjustment, the use of detergent type Nonpareil H.D. Diesel Oil is indicated. A Standard Lubrication Engineer will gladly advise you whether a conventional or detergent type oil will give you the best possible results in your Diesels.

Cleanness Aided by Base Stocks and Refining. Nonpareil H.D. Diesel Oil comes in two grades: Medium and Heavy; and is offered in addition to our regular line of Nonpareil Diesel Oils. This line, over a period of many years, has established a fine record for engine cleanness and low engine wear . . . the results of careful refining plus the use of high quality stocks. Nonpareil H.D. Diesel Oils have the same high quality plus the addition of the detergent-oxidation inhibitor.

The new oils have been thoroughly tested and proved in the laboratory and field. In every case, the results have been outstanding. Why not let a Standard Lubrication Engineer help you select the grade suitable for your service? Make a test in some unit in which conditions are severe. Phone or write for the Engineer nearest you.

Ask about this New Oil!

Get the full facts about this great new oil, how its characteristics fit it for a wide variety of service conditions. Note its applications to various makes and models of Diesels, etc. Call any Standard Oil (Indiana) office, or write 910 South Michigan Ave., Chicago, Illinois. In Nebraska, address any Standard Oil Company of Nebraska office.

New
NONPAREIL H. D. DIESEL OIL

OIL IS AMMUNITION . . . USE IT WISELY

STANDARD OIL COMPANY (INDIANA) STANDARD SERVICE

★ LUBRICATION ENGINEERING

Sarco Announces New Bulletin on Regulators and Controls

SARCO Company, Inc., recently announced a new twelve page bulletin #700 on Sarco cooling controls. The bulletin covers self-operated temperature regulators and mixing valves for the control of cooling circuits on internal combustion engines, compressors, condensers, degreasers, stills, etc. Completely illustrated, including many typical hook-ups, also capacity tables, prices, etc., a free copy of bulletin #700 will be mailed upon request to Sarco Company, Inc., 475 Fifth Ave., New York 17, N. Y.

Pusey & Jones To Build Two More C-1 Diesel Cargo Ships

THE United States Maritime Commission has awarded a contract to Pusey & Jones for two C-1 Diesel cargo vessels of 413 ft. length and 5,028 gross ton capacity.

Siegfried Rosenzweig Celebrates His 20th Anniversary With Korfund

THE Korfund Company announces that Mr Siegfried Rosenzweig, President, will celebrate his 20th year of association with Korfund in August. His experience, his research and his successful designs and applications of Vibration and Shock Control Products, have stamped him as one of the foremost men in his field today.

Siegfried Rosenzweig

Mr. Rosenzweig came to Korfund in August of 1923, in the capacity of Consulting Engineer, also as Vice President and General Manager. Elected to the offices of President and Treasurer in 1928, his years of endeavor have correspondingly been reflected in the growth of Korfund. Hearty congratulations to Mr. Rosenzweig on twenty years of splendid achievement.

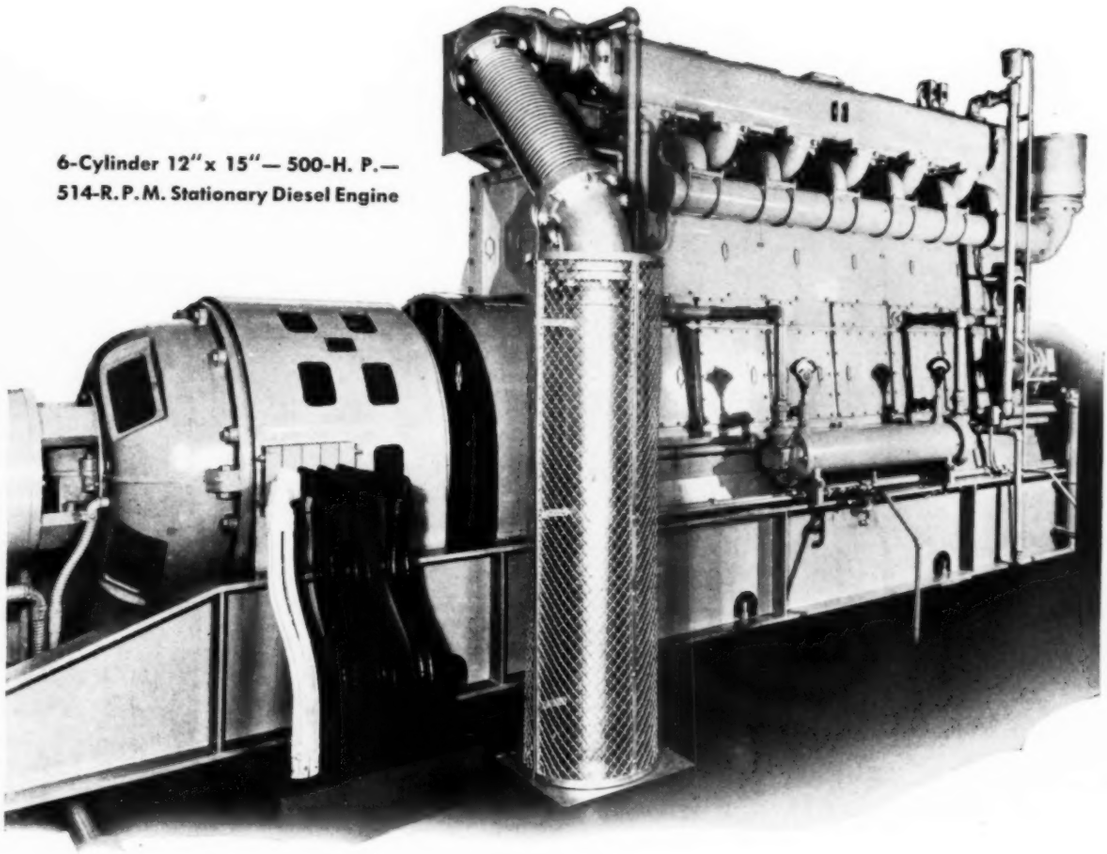
Third White Star for National Forge

THE Army-Navy Board of Production Awards has conferred the third white star on National Forge & Ordnance Company, Irvine, Warren County, Pa., effective April 24th. This signalizes the third continuous six month period that National Forge has sustained its high record for excellence in production.

National Forge was among the earliest producers of war materials to win the Navy Ordnance "E" which was presented on November 22nd, 1941. Since then it has won the All-Navy "E" and the Army-Navy "E". The first white star, for sustained excellence, was awarded on April 24th of last year followed by the second white star on October 24th.

SUPERIOR DIESELS

dependability proven by American industry



6-Cylinder 12" x 15" — 500-H. P.—
514-R. P. M. Stationary Diesel Engine

ALL over America Superior Diesels are getting the important jobs because their reputation for unfailing economical, vibrationless power has been proven many times.

It is characteristic of Superior Engines that they do every job a little better than is required. In engineering, in manufacture and in performance, world tested Superior Diesels have always exceeded the claims advanced for them.

SUPERIOR ENGINES

Division of The National Supply Co.

Executive Offices: Pittsburgh, Pa.

Sales Offices: Springfield, Ohio; Boston, Mass.; New York, N.Y.; Philadelphia, Pa.; Jacksonville, Fla.; Houston, Texas; Fort Worth, Texas; Tulsa, Oklahoma; Los Angeles, Calif.; Chicago, Ill. Factory: Springfield, Ohio.

Koppers Promotes Two American Hammered Executives

PROMOTION of two executives of Koppers Company, American Hammered Piston Ring division, is announced today by Allen W. Morton, Koppers vice president and general manager of the division.

E. A. Koether, works manager since 1936, becomes technical assistant to Mr. Morton. This is a newly-created position in which he will concern himself mainly with post-war planning.

Edgar S. Freeman, Jr., assistant sales manager, takes over Mr. Koether's duties as works manager.

Mr. Koether will devote the major part of his time to the development of new products, machine design, job methods and manufacturing standards. All engineering problems, as well as all research activities, will clear through him, Mr. Morton stated. Mr. Koether joined the Koppers Company in 1920 as an experimental engineer with the Bartlett Hayward division. He transferred to the American Hammered Piston Ring division in 1925 and was successively assistant superintendent, superintendent, and works manager.

Before his association with Koppers, he was for five years employed by the Ordnance Department of the United States Army as a division inspector at Baltimore, and civilian proof and engineering officer at the Aberdeen Proving Grounds, Aberdeen, Md. Mr. Koether was born in Baltimore April 16, 1892. He attended St. John's College, Annapolis, and the University of Maryland. He is a member of the Army Ordnance Association, Washington, and the Maryland Academy of Sciences, Baltimore. Mr. Freeman joined the company in 1920, spending his first 11 years in the shop, and rising to shop superintendent. In 1932 he was transferred to the sales department, and for two years was Chicago district manager in the automotive replacement division. He was then moved to the industrial division and has since functioned as assistant sales manager. Mr. Freeman was born in Richmond, Va., Feb. 14, 1900. He studied at North Carolina State College and Johns Hopkins University.

Norma-Hoffmann Promotes Warren D. Anderson

MR. WARREN D. ANDERSON, for over five years a member of the Engineering Staff of Norma-Hoffmann Bearings Corp., Stamford, Conn., has been made Assistant to Chief Engineer for the firm.

OFFICIAL U. S. NAVY PHOTOGS.

More Than 12,000 Diesels Are Sylphon Control Equipped

Sylphon Controls are standard equipment with many leading marine, automotive and stationary Diesel Engine builders. More than twelve thousand Sylphon Controlled Diesels on sea and land have proved the outstanding advantages of these controls in maintaining the most efficient engine temperatures—thus saving fuel, reducing engine wear, lessening carbon deposit—and positively protecting the engine against overheating damage due to cooling system or lubricating oil failure.

Typical example is the Sylphon No. 539 Pressure-Temperature Switch shown above. This safety control widely used on Marine Diesels, instantly sounds an alarm, lights a light or both, if engine cooling water temperatures go above or lubricating oil pressures go below safe limits.

Also on engines equipped with a magneto, it may be used to stop the engine automatically if desired, before any possible damage can occur.

Write for Bulletin PY-817 describing Sylphon Diesel Engine Cooling and Safety Controls.

SYLPHON CONTROLS FOR MARINE SERVICE

include:

- Heating and Ventilating Controls
- Fresh Water Heater Controls
- Fuel Oil Heater Controls
- Diesel Engine Cooling Controls
- Diesel Engine Safety Controls
- De-superheater Controls
- Steam Jet Ejector Condenser Controls
- Brine Refrigeration Controls
- Packless Valves for Hazardous Liquids

ARMY E NAVY

THE FULTON SYLPHON CO.

KNOXVILLE, TENNESSEE

Temperature Controls ... Bellows ... Bellows Assemblies

Elliott Co. Announces Election of Edgar C. Brandt to the Board and Vice Presidency

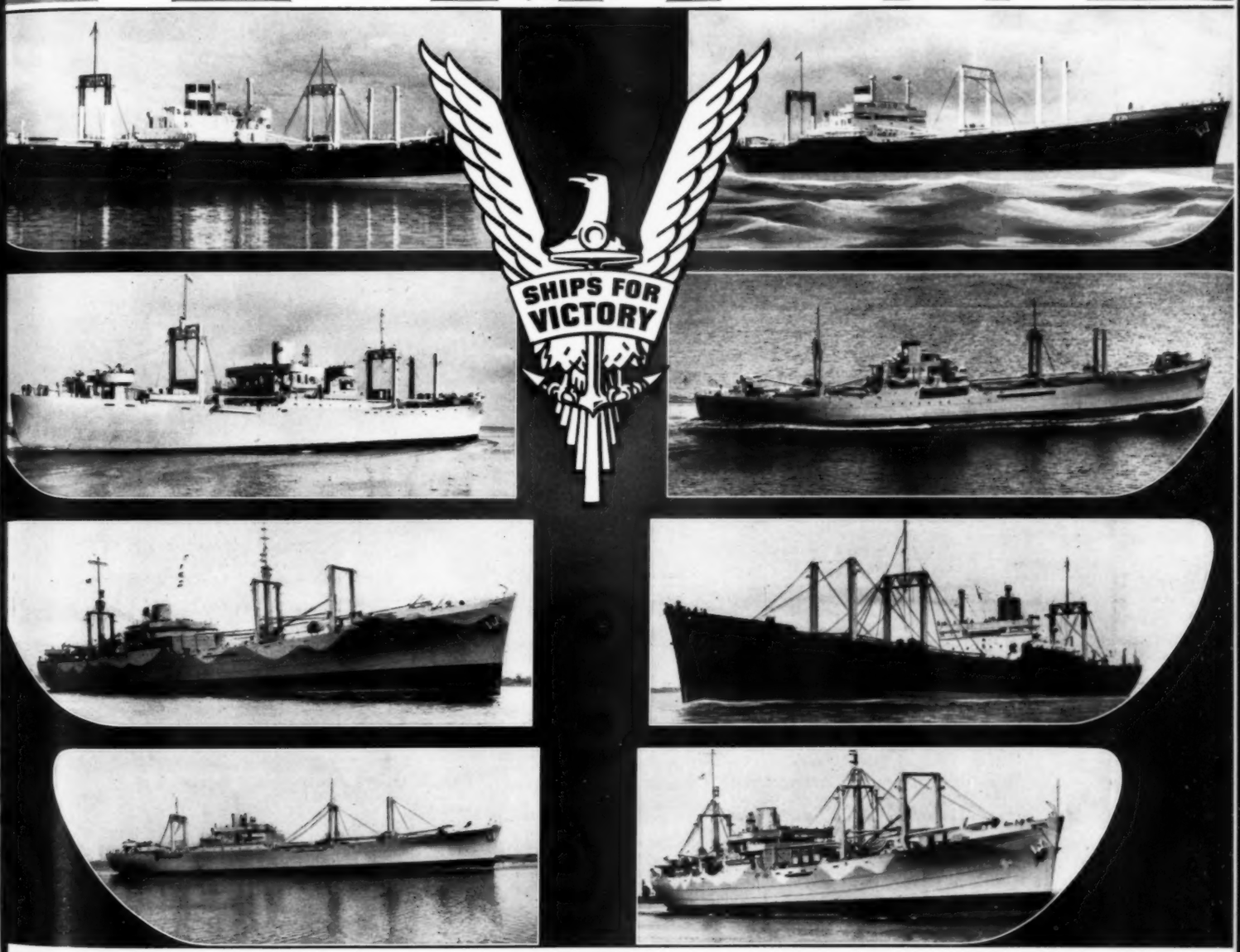
THE Board of Directors of Elliott Compa Jeannette, Pa., announces the election of Edg C. Brandt as a member of the Board and vice president in charge of manufacturing.

Edgar C. Brandt

Mr. Brandt comes to the Elliott Company a 38 years of experience with Westinghouse E tric and Manufacturing Company. He star with an engineering course in 1905 and c up through the organization. He was mana of several plants, was supervisor of machi tools and manufacturing methods of the c pany and for eight years was sales manager renewal parts and maintenance for the ent company. He has also served the War Prod tion Board for the past 2 years, one year Washington in the equipment and product division, and one year as manager of the m chine tool and equipment division in Detr during the critical conversion of automot industries to war production.

POWER

For the VICTORY FLEET



These eight vessels in wartime commerce carrying supplies to our armed forces overseas are typical of the many motorships now in service, each propelled with 6000 shaft horsepower of dependable and economical Nordberg Diesel POWER.

NORDBERG MFG. CO., MILWAUKEE 7, WIS.

Don't say DIESEL—
say NORDBERG

NORDBERG MACHINERY

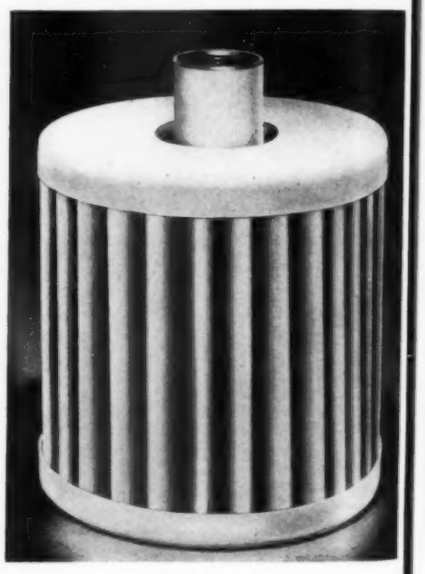
NORDBERG

DIESEL ENGINES

NORDBERG MACHINERY

Staynew Announces a Radial Fin Sump Type Liquid Filter

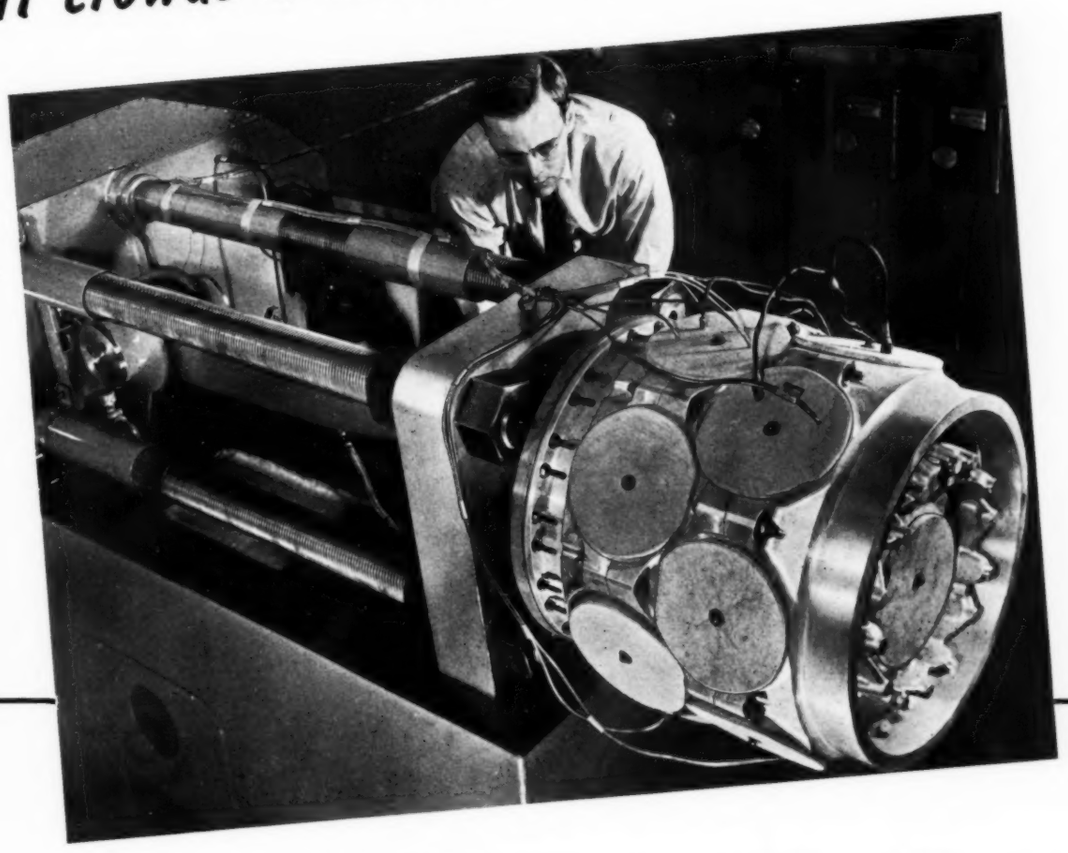
STAYNEW Filter Corporation recently announced the exclusive Staynew Radial Fin Construction has been applied to a sump type liquid filter. Designed for use wherever dirty liquids are collected, filtered, and re-circulated, the Staynew Sump Type Liquid Filter meets the demand for a compact, simplified, efficient filter unit which can be mounted on the end of pump suction lines and completely submerged in the settling basin or sump from which the pump obtains its liquid. An installation of this type protects the pump from abrasive particles which cause rapid wear and at the same time provides clean liquid at various points of usage. It prevents build-up of sludge, cuttings, sand, etc., in hydraulic systems, thus permitting less frequent inspections and clean-outs.



The Model SE Sump Filter's Radial Fin Insert provides a maximum of effective filtering area in a minimum of space. For this reason, a surface pre-coat of the solids being filtered out may be permitted to build up, without materially increasing flow resistance or decreasing flow of liquid, thus adding to its filtering efficiency.

As a result of field tests, a relatively hard finish filter medium was developed, capable of handling liquids of relatively high viscosity carrying heavy concentrations of metallic cuttings, abrasives, sludge, etc. It is particularly well adapted to filtering sulphurized and straight mineral oils and water soluble oils which are commonly used as coolants. This material is preformed in a Radial Fin shape and slips over a heavy sim-

It crowds a lifetime into a couple of days



After the war, this remarkable machine will be available for testing your Diesel engine parts

Gone are the days when "running to destruction" meant months of uncertainty. This machine at Alcoa's engine research laboratory determines the facts about a part within a few hours or days! You learn what's what while the design is alive.

On test, when this picture was taken, was a forged aluminum alloy airplane engine crankcase. Pistons, cylinder heads, connecting rods, bearings, are other typical pieces tested here, under conditions like those encountered in actual service. In peacetimes, these could just as well be parts for your Diesel engine.

Newly designed parts, not yet placed in production, can quickly be tested to destruction. Corrective changes can then be made, if necessary, and the parts retested. Or production procedures can be checked and anything suspicious ruled out. The engine builders learn within a few days how new parts behave and, as a result, our fighting men are getting better, more reliable equipment.

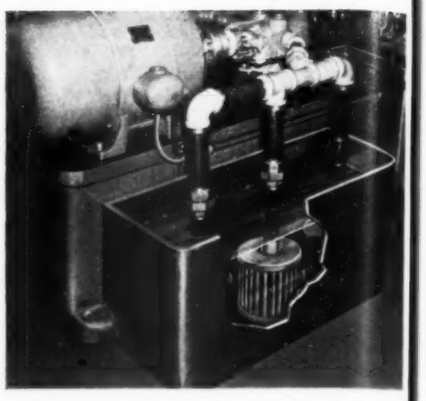
Think what this pretesting will mean to you, when you start designing for peacetime production. It's another good reason for specifying ALCOA Aluminum Alloys. ALUMINUM COMPANY OF AMERICA, 2141 Gulf Building, Pittsburgh, Pennsylvania.

ALCOA  **ALUMINUM**

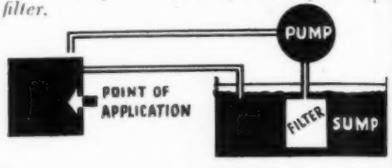
(Continued from page 72)

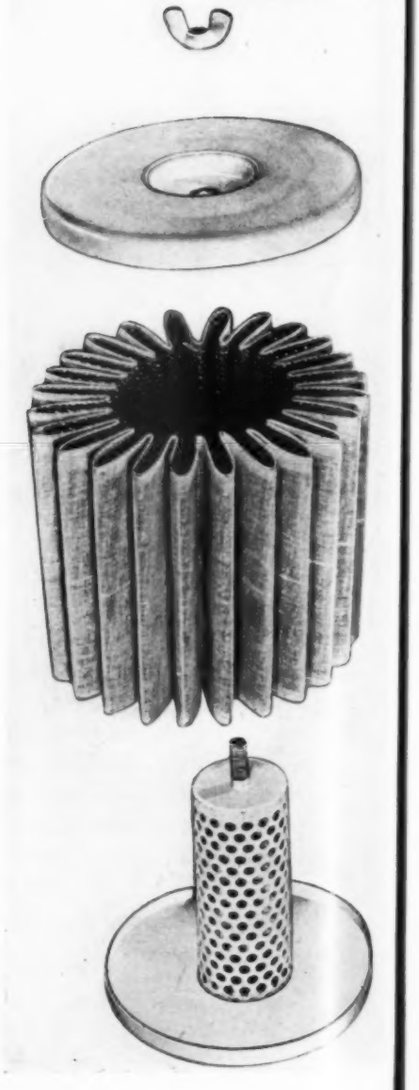
larly shaped mesh supporting form. This design permits expansion of the insert like a bellows so that accumulated material may be washed or brushed off and the medium restored to its original condition within a very few minutes. It also makes insert replacement very inexpensive.

Simplicity of construction permits dismantling of the unit without removing it from the pump suction line, if desirable. Note from the illustration there are but four major parts: An upper end plate mounting a threaded sleeve outlet connection and a perforated metal central supporting tube on which is mounted the filter insert; a heavy corrugated metal screen to supply strength and rigidity, over which slides the pre-formed filter insert; a lower end plate. A wing nut holds the entire assembly together.



Above: Cutaway view of a sump-type Staynew filter installation.
Below: Diagram of piping bookup.
Bottom: Exploded view of the Staynew liquid filter.

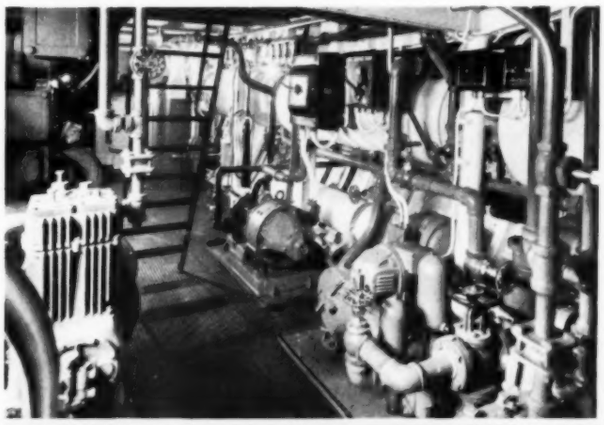


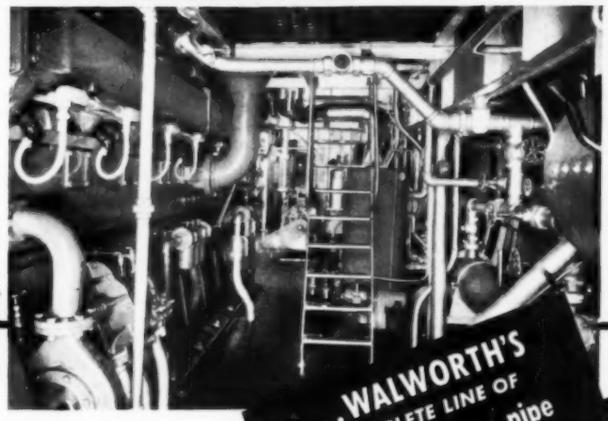


FIT THE VALVE TO THE SERVICE

KEEP SHIPSHAPE

with





...WALSEAL valves, fittings and flanges

...WALWORTH'S COMPLETE LINE OF valves, fittings, pipe and pipe wrenches

Where brass or copper pipe or tube is used in power plants, afloat or ashore, Silbraz joints made with Walseal valves. fittings, or flanges, should be installed. Silbraz joints have proven their ability to withstand bomb shock and vibration, resist corrosion, and remain tight and leakproof. The joints cannot creep or pull apart under any temperature to which the tube or pipe can be safely subjected. Silbraz joints are easy to install, even in difficult locations, and they keep piping systems shipshape. Write for detailed information.

To help you "fit the valve to the service" you will find pertinent information on Walworth's complete line in Catalog 42. Included are 78 pages of practical engineering data that simplify valve selection and make piping layouts easier. Write on your business stationery, for your free copy. Address: Walworth Company, 60 East 42nd Street, New York 17, N. Y., Department 814.

BOSTON WORKS
KEWANEE WORKS

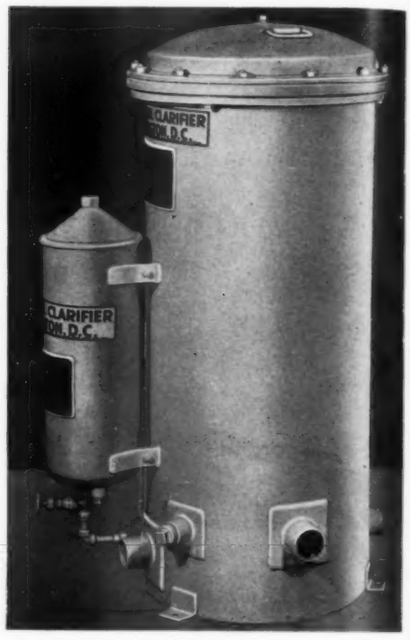
WALWORTH
valves AND fittings

WALWORTH ★ VALVES AND FITTINGS ★ ESTABLISHED 1842

DISTRIBUTORS IN PRINCIPAL CENTERS THROUGHOUT THE WORLD

New 100% Flow Filter-Clarifier

INDUSTRY has long been in need of an oil filter which would combine the advantages of 100% flow and by-pass or shunt type filters. This Filter-Clarifier, a new product just announced by the Briggs Clarifier Company, Washington, D. C., combines these advantages.



The filter section is equipped with long fibered cellulose cartridges and is designed to take the complete flow of the system thus removing all solid contamination.

The clarifier section is designed with sufficient capacity to continuously maintain the oil free of oxidation products and may be operated at will.

The application of this Filter-Clarifier is universal. It is available in sizes ranging from 5 to 200 gallons per minute. For full particulars write Briggs Clarifier Company, 1339 Wisconsin Ave., Washington, D. C.

Russia Receives Huge Shipment Of American-Made Diesels

A NEW plan for replacing war-damaged power facilities of Russia's small war plants behind the lines, through the use of a large number of small Diesel engine-driven electric generating units, was disclosed today by H. N. Mallon, president of Dresser Manufacturing Company.

As a part of America's lend-lease program, one of Dresser's divisions, Clark Bros. Co. of Olean, N. Y., is completing delivery of a $4,000,000

(Continued from page 76)

order for Diesel engines which represent a new development in the supercharged two-cycle field.

"These engines are for electric generation," Mr. Mallon said, "and are a step toward Russia's piecemeal replacement of such power facilities as the famous Dnieperstroy dam which the Russian Army blew up during the early days of the German invasion rather than have it fall into the hands of the enemy.

"It is only a beginning, for Dnieperstroy's electric generating capacity was over 700,000 horsepower, but it represented one-tenth of Russia's total capacity—and more and more power is needed for the country's war production. Thus, America's lend-lease aid is not only supplying war materials to our ally, but also new facilities to help increase Russia's own industrial production."

Mr. Mallon said that, as an outgrowth of Clark's Diesel engine development, the company has received a $3,000,000 order from the United States Government for marine engines of a similar type. In addition to the new adaptation of the supercharged two-cycle principle to the Diesel field, he said the engine cylinder walls are finished with a porous-chrome hardening process which prolongs engine life, developed by the Van der Horst Corporation, also a member of Dresser Industries.

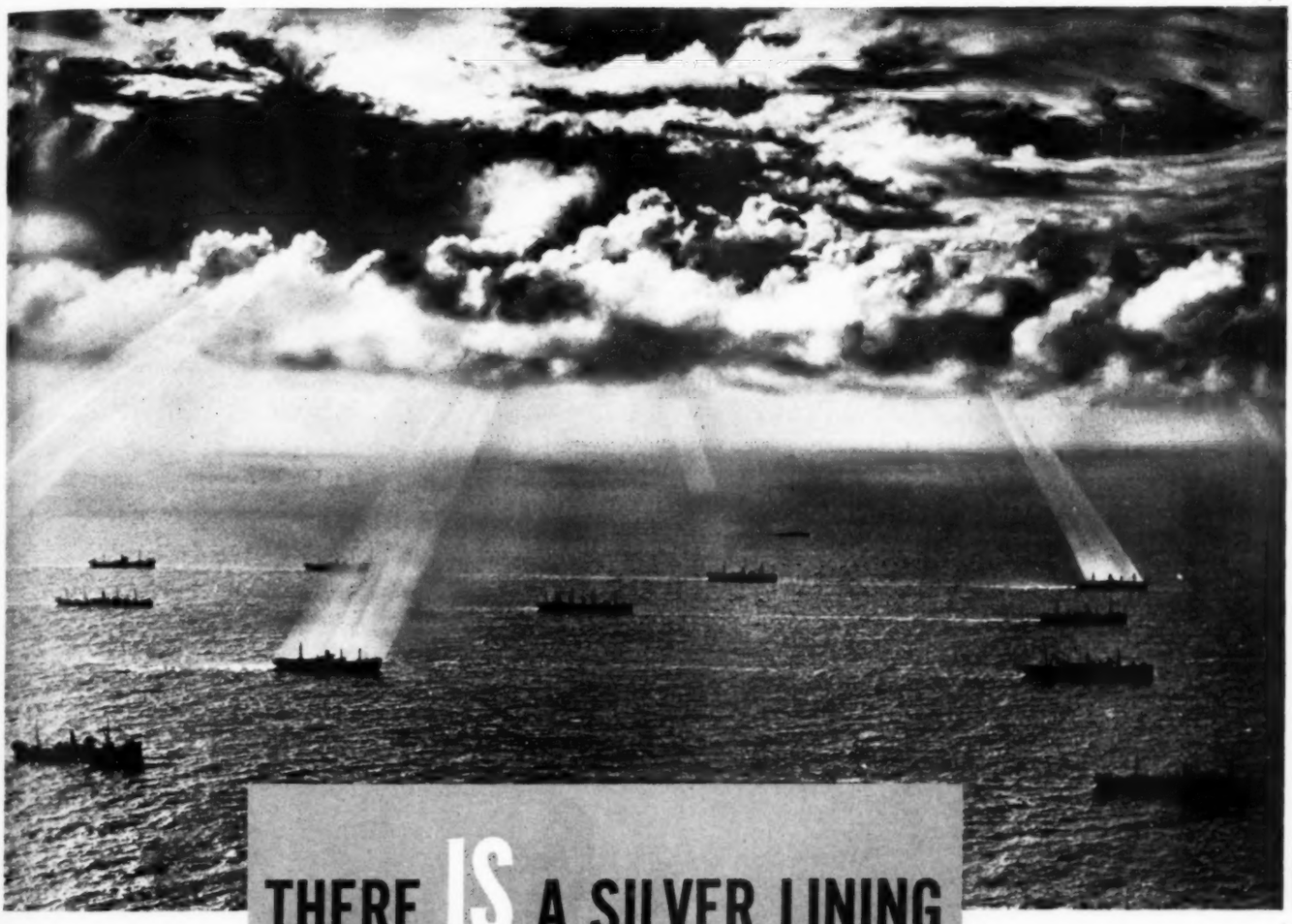
Bristol Appoints E. Nuber Manager of Pacific Coast Branch Offices & Factory

E. NUBER has been appointed Manager of the Pacific Coast Branch Offices and Factory, according to an announcement by H. E. Beane, Sales Manager of The Bristol Company.

Mr. Nuber studied electrical engineering at Brooklyn Polytechnic Institute. He was associated with the New York Edison Company for six years in their General Test and Engineering Department. He was associated with the Western Electric Company.

E. Nuber

Mr. Nuber joined The Bristol Company in 1929 as sales engineer and since then has represented them at their Boston, Akron, Waterbury, Birmingham, Chicago, and Los Angeles offices at various periods during his association with the company. Before being appointed to his new position as Pacific Coast District Manager, he was manager of the Akron branch office and factory. He will make his headquarters at the company's branch offices at 40 Berry Street, San Francisco, California.



THERE IS A SILVER LINING

In each convoy—a few Liberty Ships. In some—Many. And hundreds more to come.

What seem to be rays of hope now, will eventually floodlight a blazing victory.

In the convoy-studded seas, many units of the Allied armadas are powered with steam and diesel engines from the famous Hamilton engine shops of General Machinery. There is nearly a century of know-how in General's machinery making.

GENERAL MACHINERY CORPORATION

HAMILTON, OHIO

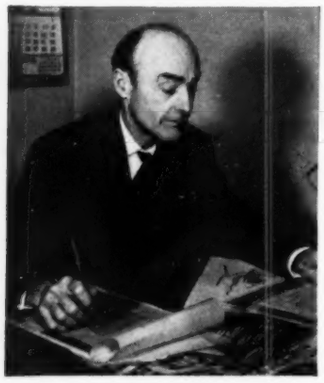
THE NILES TOOL WORKS CO.

THE HOOVEN, OWENS, RENTSCHLER CO.

GENERAL MACHINERY ORDNANCE CORPORATION

John L. York is Clark Advertising Manager

CLARK BROS. CO., Inc., of Olean, New York, have recently announced the appointment of Mr. John L. York as Advertising Manager.



John L. York

Mr. York has had many years of experience in the advertising field. He studied art at the Art Institute of Chicago and worked with one of the leading illustrators of the country for a number of years acquiring a considerable knowledge of advertising layout, illustration and copy.

Following this experience, he served with the Waltham Watch Company both in this country and in England and later as Advertising Manager of the Watson Company of Attleboro, Massachusetts and of the Metro Station, Inc., now part of the Socony Vacuum Oil Company. He also served for short periods with advertising agencies.

Hilco Portable Oil Filters

THIS unit consists of a standard Hilco Hyflow oil filter, a small gasoline engine driving a rotary pump for forcing the oil through the filter. The exhaust gas is passed through a jacket around the filter for heating the filter unit.

This is a self-contained unit convenient for operation in remote sections or at points where electric power is not readily available.

These portable filters, manufactured by The Hilliard Corporation, are suitable for filtering many types of oils such as those used for lubrication and general use in Diesel engines, gasoline engines, steam turbines, steam engines, locomotives, vacuum pumps, gas engines, hydraulic presses, air compressors and airplane engines, also machine tool cutting oils and insulating oils such as those used in transformers and circuit breakers. Filtering of fuel oils is also successfully accomplished.

When operating the unit is simply wheeled up to the equipment containing the oil, which is piped to the filter inlet, purified and returned to the equipment, or, this same work can be accomplished by installing a dirty oil and clean oil tank. These units are available in sizes ranging from one gallon per minute up to several hundred barrels per hour, depending on the type of fluid to be filtered.

WHEN INVASION BOMBERS DUMP CARGOES OF DEATH

PEDRICK PRECISION *brings 'em back*

● Four-motored birds of prey swarm high overhead . . . brush earth's blue dome with their tail-feathers . . . open their claws to hurl death and destruction on invasion-targets miles below. Timed to split seconds, they dare not miss a single wing-beat.

Flying with these invasion bombers are Pedrick *precisioneered* piston rings. They fly in another sense, too, back and forth on cylinder-walls, faster than eye can follow. Thanks to Pedrick's heat-shaping process, they retain their tension, dimension, and flatness, even when only 1/16 of an inch wide!

In American and Allied bombers, fighters, jeeps, half-tracks, trucks, or PT boats . . . wherever compression is of first importance and precision is a *must* . . . Pedrick rings stand up and deliver in battle. They also save oil and fuel on the home-front, as they deliver full power to essential trucks, buses, tractors, and passenger-cars. Put your faith in Pedrick!

HOARDING IS PATRIOTIC . . . PROVIDED YOU'RE HOARDING WAR BONDS

WILKENING MANUFACTURING CO., Philadelphia and Scranton, Pa. *In Canada:* Wilkening Manufacturing Co. (Canada), Ltd., Toronto.

ATTENTION: DIESEL AND AUTOMOTIVE ENGINEERS

Our latest catalog shows how Pedrick makes *precisioneered* rings that have correct and lasting tension, accuracy, flatness, fit, quick seating, and long life. It also gives recommended installations for various types of pistons and service-conditions. It will help you now to keep present equipment operating as well as serve as a guide in designing post-war products. Write for your copy.

Pedrick

precisioneered **PISTON RINGS**

Kontrol-Fan Appoints E. J. Sanders As Vice President

ANNOUNCEMENT was made recently of the appointment of E. J. Sanders as vice-president and director of Kontrol-Fan, Inc., Glendale, Calif. In making the announcement, Ed Bishop, president of the firm, stated that Mr. Sanders will also act as chief engineer. Kontrol-Fan, Inc., now active in special government work, manufactures thermostatically operated, controllable-pitch blade fans for gasoline, natural gas, and Diesel engines and other industrial equipment.

Mr. Sanders was with Gilmore Oil Company for thirteen years first as a technical engineer and later as chief engineer of the lubrication department. While with this company he initiated and carried out extensive road tests and high speed tests which contributed substantially to the progress of controlling engine temperatures. Prior to his recent move to Kontrol-Fan Inc., Mr. Sanders was equipment engineer with J. E. Haddock, Ltd., construction engineers. He is a full member of the Society of American Engineers.

Three Caterpillar Men Advanced

HENRY H. HOWARD, who has been associated with Caterpillar Tractor Co. since 1926, is returning from a war-time post with the United States Ordnance Department in Detroit to become "Caterpillar's" General Sales Manager.

H. H. Howard

Mr. Howard was Manager of the Engine Sales Department of the company when called for temporary emergency duties in the War Department in February, 1942. He has served as consultant to Brig. General J. K. Christmas of the Tank and Combat Vehicle Division of the Ordnance Department, which has consented to release him from his duties in that department.

J. Q. McDonald

J. Q. McDonald, who assumed the extra burdens of the General Sales Manager's office in addition to his regular duties as Export Manager when G. E. Spain was promoted from General Sales Manager to a Vice Presidency in May, 1942, will now be free to devote his broad experience and full time to planning and preparing for the problems and enlarged opportunities that will exist in the export field.

H. W. Smith, Assistant Manager of Engine Sales, who has been in active charge of that department during the time Mr. Howard has been in government service, has been made Manager of Engine Sales.

Mr. Howard, a graduate of the University of California, joined "Caterpillar" early in 1926, working first in the Parts Department and later in the Export Offices of the Company's San Leandro, California plant. He spent three years in Australia as Export Representative and after his return to this country was assigned to duties in the Domestic Sales Department, advancing to Manager of Governmental Sales in 1935. In 1937 he was made Manager of Engine Sales.

H. W. Smith

Mr. McDonald, also a graduate of the University of California, has been with the company since 1927 when he joined as supervisor of agricultural sales for the western United States and western part of Canada. After a year in Europe to study the application of "Caterpillar" track-type Tractors in Russia he spent four years as district representative in this country. He became district representative in London and in the countries of northern Europe in 1934, returning two years later to Peoria to serve as Export Sales Supervisor and Assistant Export Sales Manager. He became Export Sales Manager in May, 1940.

Mr. Smith, a native of Philadelphia, has for many years been associated with the automotive industry. He held responsible positions with the Chester Engineering and Machine Co. of Chester, Pa.; the Pope Manufacturing Co. of Westfield, Mass.; Fageol Motor Co. of Oakland, California, the pioneer of the modern bus; Great Western Motors of San Jose, California and R. B. Fageol, Inc., Los Angeles, an engine development company, before joining the "Caterpillar" organization.

He first became associated with the company in 1927 as assistant to the chief engineer and factory manager of Western Harvester Co., Stockton, California, a subsidiary of "Caterpillar."

Volume Eight of the DIESEL ENGINE CATALOG is now available. Completely revised, this book contains the description and detailed specifications of One Hundred and Sixty-two engines. Nothing like it published. The most useful Diesel book available, containing a complete cross section of this rapidly expanding industry, insofar as the engines and accessories available are concerned. An indispensable book for all interested in Diesel engines.

JUST OFF THE PRESS **ORDER YOUR COPY OF VOLUME EIGHT • NOW !!**

162 engines described and illustrated

$5.00

NOW READY
TO MAIL
NEW - BIGGER - BETTER

DIESEL ENGINES DESCRIBED

Alco Four Cycle Stationary
Alco Universal Type
Alco-Sulzer "T" and "TM"
Atlas Imperial
Atlas-Lanova
Buckeye Diesels
Buda-Lanova Diesels
Busch-Sulzer Bros. 2-cycle
Busch-Sulzer Bros. 4-cycle
Caterpillar Industrial Engines
Caterpillar Marine Engines
Chicago Pneumatic Model 8-CP, and 9-CP
Chicago Pneumatic Type 16-CP
Chicago Pneumatic Type RHB-50
Clark Bros. Diesels
Consolidated Diesel Electric Power Units
Cooper-Bessemer Type JS
Cooper-Bessemer Type EN & GN
Cooper-Bessemer Type LS Marine
Cummins Diesels
De La Vergne Series 10
De La Vergne Model VG
De La Vergne Model VM
De La Vergne Gas Engines
De La Vergne Model VO
Dodge-Lanova Diesels
Enterprise Diesels
Fairbanks-Morse 33 and 37
Fairbanks-Morse 36
Fairbanks-Morse 42
Fairbanks-Morse 32 and 35
Fairbanks-Morse Model 38
Fairbanks-Morse Model 46
Fulton Diesels
General Motors Model 71
General Motors Model 567
Gray Marine Diesels
Guiberson Radial Diesels
Hamilton Engines
Hercules Diesels
Hill Diesels
Ingersoll Rand Type "S"
International Harvester
Kahlenberg Engines
Kermath 4-cycle
Lathrop Types D50 and D80
Lister-Blackstone Diesels
Lorimer Diesels
Mack-Lanova Diesels
Murphy Diesels
Nordberg 4-cycle Diesels
Nordberg 2-cycle Diesels
Nordberg Gas-Diesels
Palmer Bros. Diesels
Rathbun-Jones Diesels
Rathbun-Jones Gas Engines
John Reiner Marine Units
Sheppard Diesels
Superior Model "A"
Superior Model "D"
Superior Type M
Superior Type S
Union Diesels
U. S. Diesel Plants
Venn-Severin Models HC and M
Washington Iron Works Diesels
Waukesha-Hesselman Type
Witte Types
Wolverine Diesels
Worthington Diesels
Worthington Gas Engines

DIESEL

DIESEL ENGINES, INC.—Two West Forty-Fifth Street—New York 19, N.Y.

Enter my order for a copy of the New Diesel Engine Catalog, Volume Eight, Edited by Rex W. Wadman, for which I enclose $5.00.

NAME: _____

ADDRESS: _____

Please print name and address

Sorry, we cannot imprint names on this year's edition of the Diesel Engine Catalog

(Continued from page 83)

In 1929 Mr. Smith became Assistant Chief Engineer of the plant at San Leandro and in September, 1930, came to Peoria in a like capacity. Between that time and 1932, when he came into the Engine Sales Department as sales engineer, he was in charge of converting "Caterpillar" Diesel, gasoline and natural gas engines into industrial power units. He became Assistant Manager of Engine Sales in 1937.

Crocker-Williams Announces New Motor and Generator Literature

FREE literature covering the following items is available from the Crocker-Wheeler Electric Manufacturing Co., Division of Joshua Hendy Iron Works, Ampere, N. J.:

Squirrel Cage Motors (form SCF-1)—Describes and illustrates the various enclosures and degrees of protection available for squirrel cage motors, ½-75 horsepower, and internal construction features.

Direct Current Motors (form SCF-2)—Describes and illustrates the various enclosures and degrees of protection available for direct current motors, ¾-7½ horsepower, and internal construction features.

Shipboard Pump Motors (form SCF-102)—Photographs and application information on marine installations of pumps and motors.

Shipboard Auxiliary Generators (form SCF-101)—Photographs and descriptions of turbine driven shipboard auxiliary generators.

Requests should be addressed to Distribution Engineering Dept., Crocker-Wheeler, Ampere, N. J.

C. J. Freeman Made Sales Manager of Kerkling and Company

RALPH H. EVERMAN, vice president and general manager of Kerkling and Company, Bloomington, Indiana, manufacturers of K & W Metallic Seal and Licensor of the K & W Method for repairing cracked blocks and heads, announces the appointment of C. J. Freeman as general sales manager. Mr. Freeman will direct sales activities for all divisions excepting the Pacific Coast which will continue under the direction of Mr. C. A. Kerkling, president.

C. J. Freeman

Mr. Freeman takes over his new office with a background of varied and valuable sales and engineering experience in the automotive industry since 1909. For the past several years he has acted as special representative for Kerkling and Company in the Northwest territory. Mr. Freeman will be located at the company's general office, Bloomington, Indiana.

Huizinga to Join the National Supply Company

MR. A. T. HUIZINGA has resigned as assistant treasurer of Montgomery Ward & Company to become treasurer of The National Supply Company at Pittsburgh, Pa., large manufacturer of oil field machinery and equipment and Diesel engines.

A. T. Huizinga

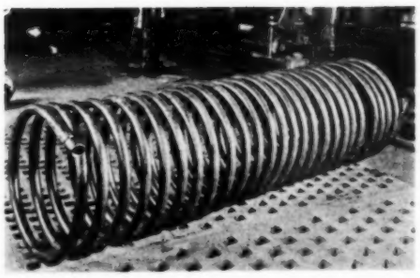
Following his association with a group of Chicago banks from 1920 to 1928, Mr. Huizinga was connected with the Harris Trust and Savings Bank of Chicago from 1928 to 1932. During this time he was active in the American Bankers' Association, the Financial Advertisers' Association, and a director in the American Institute of Banking.

Mr. Huizinga joined Montgomery Ward & Company in 1932 and was elected assistant treasurer in 1934, which position he has held until the present time. He has been active in civic affairs in Chicago, being a divisional chairman of the Community Fund for many years, a member of the Board of Managers of the YMCA of Chicago, and an officer of several other philanthropic organizations.

The National Supply Company is the largest manufacturer and distributor of oil field machinery and equipment.

One Way to Get Heat In A Diesel Cold Storage Plant

TRUE American ingenuity was recently displayed by J. C. Lieb, president of the Baltimore Cold Storage Company, when he found his concern confronted with a serious problem caused by the eastern oil shortage. Lieb had enough oil in his quota to run his big Diesel engines and produce cold, but not enough left over to heat the building next winter and keep his employees warm.



Wrought iron pipe coil wrapped around Diesel exhaust supplies heat.

He gave the matter of heat and cold considerable thought and finally came up with a solution. First, he installed tanks around the exhaust pipes of his motors; then he filled the tanks with tightly coiled water pipes using wrought iron because of its easy bending qualities and resistance to corrosive gases. Thus, while the big Diesels are busy producing cold, their hot exhaust pipes are busy preheating water to reduce the fuel consumption of the hot water heating system of the building. Lieb reports the system works.

THE EXECUTIVE WHO STOPS TO THINK . . .

Knows that "10% for War Bonds isn't enough these days"

Workers' Living Costs going up . . . and Income and Victory Tax now deducted at source for thousands of workers . . .

Check! You're perfectly right . . . but all these burdens are more than balanced by *much higher* FAMILY INCOMES *for most of your workers!*

Millions of new workers have entered the picture. Millions of women who never worked before. Millions of others who never began to earn what they are getting today!

A 10% Pay-Roll Allotment for War Bonds from the wages of the family bread-winner is one thing—*a 10% Pay-Roll Allotment from each of several workers in the same family is quite another matter!* Why, in many such cases, it could well be jacked up to 30%—50% or even more of the family's *new* money!

That's why the Treasury Department now urges you to revise your War Bond *thinking*—and your War Bond *selling*—on the basis of *family* incomes. The current War Bond campaign is built around the family unit—and labor-management sales programs should be revised accordingly.

For details get in touch with your local War Savings Staff which will supply you with all necessary material for the proper presentation of the new plan.

Last year's bonds got us started—*this year's bonds are to win!* So let's all raise our sights, and get going. If we all pull together, we'll put it over with a bang!

This space is a contribution to America's all-out war effort by

you've done your bit
. . . now do your best!

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

R. F. Wadman

Editor—DIESEL PROGRESS

Bristol Appoints J. W. Peckham Manager of Development and Design Engineering

J. W. PECKHAM has been appointed manager of the Development and Design Engineering Department for The Bristol Company, Waterbury, Connecticut, manufacturers of automatic control and recording instruments, according to an announcement made by L. G. Dean, Vice-President in Charge of Engineering and Sales.

J. W. Peckham

Mr. Peckham was graduated in electrical engineering from Rhode Island State College in 1921, after which he joined the Radio Research Department of the General Electric Company. In 1922 he joined the Bristol radio engineering department. In 1940 he was appointed Pacific Coast district manager, in charge of the company's San Francisco, Seattle, and Los Angeles offices and San Francisco branch factory. Mr. Peckham will make his headquarters at the general offices of the company, Waterbury, Connecticut.

West Coast Diesel News

By JIM MEDFORD

HARMONY, a 70-foot seiner of the French Sardine fleet, San Pedro, California, has been repowered with a new Fairbanks-Morse four cylinder, 160 hp. Diesel by the Garbutt and Walsh yard.

THE 67-foot halibut dragger *Soupfin* has received a new 135 hp. Atlas Imperial Diesel and a 15 kw. General Electric generator at the Seattle, Washington, yard of the Harold Hansen Boat Company. Harold Arenson is owner.

AT San Diego, California, Owner O. H. Warner has repowered his 57 ft. fishboat *Electra* with a new six cylinder, 135 hp. Caterpillar Diesel fitted with 2 to 1 Twin Disc gears.

AT Newport Beach, California, yard of the Ackerman Boat Company, twin Gray 165 hp. six cylinder Diesels have been installed in the new 72-foot landing boat completed under government contract.

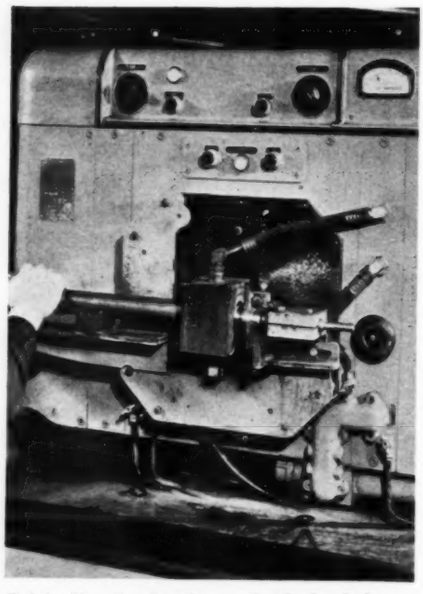
A CATERPILLAR Marine Diesel with 3 to 1 Twin Disc gears has been installed in the Bankline Oil Company's tug *Bankline*, San Pedro, California. This 60 hp. Diesel swings a Lambie wheel at 600 rpm.

TEN knots with her new 120 hp. Cummins Diesel is the record of the 64-foot dragger *Andrew Jackson* recently completed by Bob Richards and Nels Franklin of Portland, Oregon.

Material and Forging Facilities Saved by 41-second "Three-in-One" Tocco Induction Operation

A SIMPLE change in the design of a TOCCO induction fixture has made possible a rapid "three-in-one" heat treating operation that is saving steel and relieving forging facilities for a mid-west automotive manufacturer producing Diesel engines for Army tanks.

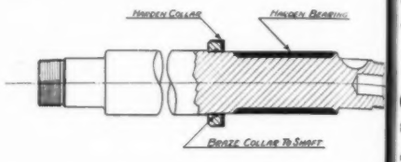
Used on vital engine balancer shafts, the TOCCO induction treatment hardens a bearing surface and a thrust face while brazing a collar to the shaft. The entire three-way operation is done simultaneously in only 41 seconds. This was revealed by A. O. Wood, Chief Engineer of the TOCCO Division of The Ohio Crankshaft Company, Cleveland, who indicated that this application is but one reason why the U. S. Army Ordnance has publicly commended induction heat-treatment and what it has done to conserve materials, and facilitate the tank program.



Originally, the bearing end of the balancer shaft was turned down to size from bar stock the diameter of a collar which forms a thrust face at the end of the shaft. It was necessary to copper plate the end and to carburize the piece. In the turning down process metal was wasted.

A second method for producing the shaft was introduced specifying hot upsetting from nominal diameter stock, machining the piece, TOCCO hardening the bearing surfaces and grinding to finish.

Then a third production procedure was adopted by redesigning the TOCCO inductor to include brazing a separate collar to the shaft. It is the current operation that has really effected beneficial savings in material and time. Though the hot upsetting process used in the second production method just described effected an economy in steel, the current use of a separate collar has helped to alleviate critical forging facilities and save on machining time as well. Further specifications calling for TOCCO hardening eliminated carburizing material, the time required for packing, and several previous operations.



Now, the collars are turned out quickly on screw machine, carburized separately and the positioned on the shaft preparatory to heating with the brazing material placed in a groove in the collar. The collars are 2-1/16" in diameter with a face 9/32" deep. Heat for hardening the bearing surface which is 1½" O.D. and 2⅞" wide, reaches 1550° F. At the same time the thrust face adjacent is also heated to the temperature which is such as to penetrate the silver solder for the brazing of the collar. The water quench does not affect the braze as the inductor is designed to act something like a shield. Thus, as the bearing surface and the thrust face are hardened, the collar is brazed uniformly to the shaft. The entire application requires only 41 seconds. A hardness of 56-58 Rc on the thrust face and 50-55 Rc on the bearing surface is effected. Distortion is wholly lacking.

"The TOCCO machine on which these operations are performed is a standard 80 kw. tube station unit," said Mr. Wood. "Its simplicity is typical of this process which in the past two years has made such amazing advances."

West Coast Diesel News

By JIM MEDFORD

CAPTAIN John Sorenson's 50-foot fishing craft *De Foe* has a new Caterpillar 60 hp. marine Diesel with Twin Disc gears installed by the San Pedro (California) Yacht and Boat Works.

THE Pacific Boat Building Company of Tacoma, Washington, has a record of eight completed Diesel engined boats in a row including the 175 hp. Fairbanks-Morse driven 85-foot seiner *San Francisco* for West Coast interests

WORTH outstandin Lynch Shi fornia of nola tuna patrol ves banks-Mor Diesels.

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CAPTAIN ton, has co *cade*. The perial Dies and Exide

THE Long completed purse seine with Twin do bait fish

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NEIL BUR Harbor, Cal combination hp. Diesel, a

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ANOTHER ing boat to marine Dies A. H. Merri Twin Disc g

NEWPORT build tugs fo footers with hp. Diesels.

THE British Barge Comp their 43-foot 120 hp. Fairl

WORTHY of mention in this column is the outstanding Diesel vessel conversion by the Lynch Shipbuilding Company, San Diego, California of the former $225,000, 135-foot Castagnola tuna clipper *Conte Grande* to a naval patrol vessel. Main engine is a 680 hp. Fairbanks-Morse Diesel auxiliaries 2 Buda-Lanova Diesels.

THE 85-foot purse seiner *Sea Rover* of the French Sardine fleet, Los Angeles Harbor, has received a new Caterpillar marine Diesel, a 4¼ by 5½ inch, 35 hp. engine.

CAPTAIN R. D. Suryan of Seattle, Washington, has completed his new 77-foot fisher *Cavalcade*. The main engine is a 250 hp. Atlas Imperial Diesel with a 5 hp. Atlas-Lanova auxiliary and Exide batteries.

THE Long Beach (California) Boat Works has completed repowering John Harvey's 65-foot purse seiner *Onward* with a Caterpillar 135 hp. with Twin Disc reduction gear. She will now do bait fishing.

A NEW addition to the San Diego, California, tuna fleet is the Campbell Machine Company built 71-foot *Rose* for John Ghio. Main engine is a 125 hp. Union Diesel and a 40 hp. Superior Diesel auxiliary.

NEIL BURTON of Long Beach-Los Angeles Harbor, California, has repowered his 65-foot combination fish boat with Caterpillar V-8, 135 hp. Diesel, and Twin Disc reduction gears.

THE Shepherd Tractor and Equipment Co., Los Angeles, California, has received an order from the Lynch Shipyard at San Diego for a Caterpillar marine Diesel with 40 kw. Westinghouse generator.

ANOTHER San Pedro, California, fleet fishing boat to be repowered with a Caterpillar marine Diesel is the 48-foot *Annie* owned by A. H. Merritt. This is a 60 hp. engine with Twin Disc gears.

NEWPORT Harbor, California, boatyard will build tugs for the Army Supply. They are 97-footers with Fairbanks-Morse six cylinder, 450 hp. Diesels.

THE British Columbia yard of the McKenzie Barge Company, Vancouver, have completed their 43-foot logging tug *Ossian* and installed a 120 hp. Fairbanks-Morse Diesel.

Army-Navy "E" to Michiana Products Corporation

MICHIANA Products Corporation, Michigan City, Indiana, manufacturers of oil filters for Diesel engines, have received the coveted Army-Navy "E" award for outstanding war production efforts. In a colorful ceremony at the home plant May 17, Colonel Charles McKnight, U.S.A., presented the "E" pennant which was received by C. H. Cannon, vice president, Ralph K. Surface, assistant vice president, and Lester Meads, president Federal Labor Union 22165. Formal acceptance of the award on behalf of Michiana employees was acknowledged by President O. M. Carry. Lt. Commander George B. Storer, U.S.N., presented the "E" lapel pins to Michiana employees through their representatives, Lester Meads, O. D. Hitt, Rose Hedstrom and Marie Burns. The introductory address was given by vice president, H. Klouman, and Michael Ward, metallurgical engineer presided as master of ceremonies.

Left to right: Lester Meads, Pres. of the Union, Col. Charles McKnight, U.S.A., Lt. Comdr. Geo. B. Storer, U.S.N.; R. K. Surface, Asst. to the V.P., C. H. Cannon, V.P.

Vest Pocket Crane "Trouble Shooter" Offered by P&H

ARRANGED in simple question and answer form and indexed for quick reference, a handy pocket-size manual for men in charge of servicing overhead traveling cranes was recently issued by Harnischfeger Corporation, manufacturers of P&H electric cranes. Purpose of the booklet is to help industry keep this vital materials handling equipment operating safely and efficiently, and to hold servicing time down to a minimum by pointing out the most likely causes of specific troubles. Under each question pertaining to certain trouble are listed the probable contributing conditions which should be inspected and remedied to stop the trouble at its source. In addition, the "Trouble Shooter" booklet contains complete lubrication charts, standard crane operating signals, a sample inspection report, operating cautions and a schedule on safe lifting of loads with chain, wire rope, manila rope, and the sisal rope slings. Copies will be sent free to men responsible for maintenance of plant equipment, on request to the Crane Division, Harnischfeger Corporation, Milwaukee, Wis.

J. H. Fountain Appointed Sperry Gyroscope Co., Publicity Manager

IN a move to expand its public information activities, particularly to further acquaint members of the armed forces with the continued development of the many military and naval products it manufacturers, announcement was made today by R. B. Lea, vice-president for sales, Sperry Gyroscope Company, of the appointment of J. H. (Joe) Fountain as publicity manager in the public information department which is headed by J. A. Fitz as director.

J. H. Fountain

Fountain, who formerly was in charge of publicity for the Canadian National Railways' System in the United States, will in addition perform certain assigned duties as special assistant to the vice-president for sales of Sperry, Mr. Lee said.

During the last four of his 15 years with the Canadian National, Fountain's headquarters were in New York where he directed publicity activities of the Canadian National and Central Vermont Railways, the Canadian National Steamships, Ltd., and Trans-Canada Air Lines in the United States.

A native of Vermont, Fountain served overseas in World War I and was one of the organizers of The American Legion. During his newspaper career from 1919 to 1928 he was on the staffs of several New England and New York newspapers and, as a representative of The Associated Press, was the only reporter to witness the homestead inauguration of President Calvin Coolidge.

NORMA-HOFFMANN ADVANCES FRANK L. WRIGHT

NORMA-Hoffmann Bearings Corporation, Stamford, Connecticut, announces that Mr. Frank L. Wright—formerly Chief Metallurgist with a connection of over 11 years with the firm—has been advanced to the position of manager of Research.

Frank L. Wright

★ ★ ★ ★ ★

POWERED with a 200 hp. Washington Diesel, the New Westminster (B. C.) yard of the Star Shipbuilders have completed the 80-foot seiner *Cape Mark* for the Canadian Fishing Company, Vancouver, B. C.

Latest Diesel Patents

A description of the outstanding patented inventions on Diesel and Diesel accessories as they are granted by the United States Patent Office. This information will be found a handy reference for inventors, engineers, designers and production men in establishing the dates of record, as well as describing the important Diesel inventions.

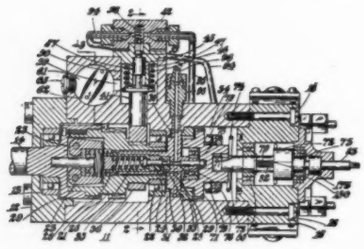
Conducted by C. CALVERT HINES

2,291,939

PUMP AND FUEL INJECTION CONTROL DEVICE

George Amery, London, England
Application August 15, 1938, Serial No. 225,025
In Great Britain August 25, 1937
10 Claims. (Cl. 123—139)

1. Fuel-injection apparatus for an internal combustion compression-ignition engine, comprising in combination fuel injectors on the engine cylinders, a pump for supplying fuel oil at injection pressure to the injectors, a distributor connected to the pump and the injectors for timing the operation of the injectors, said distributor having valves for controlling the flow of fluid under pressure to open and close the injectors and rotatable mechanical means for actuating said valves, a rotatable driving element, adjustable operative connections therefrom to the said mechanical means which actuate the distribution valves such that

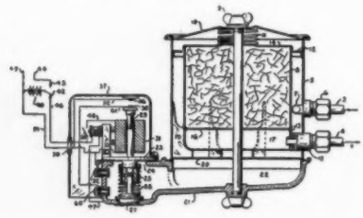


the angular relationship between the driving element and the said means may be adjusted, a control cylinder, and a yieldingly supported piston therein subject to fuel-pump pressure operatively connected to the said adjustable operative connections to vary the said angular relationship and so determine the timing of the distributor.

2,295,097

APPARATUS FOR REMOVING WATER FROM OIL-CIRCULATING SYSTEMS OF INTERNAL COMBUSTION ENGINES

Paul E. Waugh, Fort Wayne, Ind., assignor to Tokheim Oil Tank and Pump Company, Fort Wayne, Ind., a corporation of Indiana
Application April 5, 1939, Serial No. 266,226
8 Claims. (Cl. 123—196)

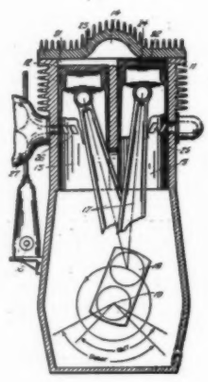


1. An attachment for the oil circulating system of an internal combustion engine comprising a container within a container, the circumferential wall of the inner container being spaced from the circumferential wall of the outer container, the inner container being in communication through its top with the space between the containers, but closed at its bottom against communication with said space, oil filtering material in the inner container, means providing a water collecting chamber beneath said containers and in communication with the space between said containers, an inlet adapted to be connected to the oil circulating system and extending through the outer container into the space between the containers above the water collecting chamber and an outlet conduit adapted to be connected to the oil circulating system extending through the containers into the inner container.

2,295,120

COMPRESSION IGNITION ENGINE

Wilfred Gibson Maw, Dudley, England, assignor to R. A. Lister & Company Limited, Dursley, England
Application April 17, 1941, Serial No. 389,06
In Great Britain April 4, 1940
4 Claims. (Cl. 123—53)



3. A fuel-injection-compression-ignition engine having a crankshaft, a pair of side-by-side cylinders with parallel axes on opposite sides of the crankshaft axis, said cylinder axes being in a plane which is inclined to the crankshaft axis, a cylinder head providing a common combustion space with which both said cylinders communicate, an injector adapted to inject fuel into said common combustion space, and pistons in said cylinders connected to a common crankpin of said crankshaft, whereby one of the pistons will lead the other along its cylinder bore, the dimensions being such that the leading piston will reach its outer dead-centre position approximately 20° before said crankpin will be mid-way between the cylinder axes, and such that the lagging piston will reach its outer dead-centre position approximately 40° after the leading piston has reached its outer dead-centre position.

2,298,080

LUBRICATING OIL FOR DIESEL ENGINE

Philip S. Clarke, Palos Verdes Estates, and Marcellus T. Flaxman, Inglewood, Calif., assignors to Union Oil Company of California, Los Angeles, Calif., a corporation of California
No Drawing. Application November 19, 194
Serial No. 366,236
14 Claims. (Cl. 252—39)

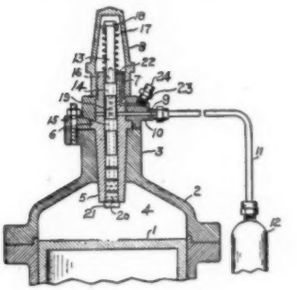
1. A lubricating oil for breaking-in internal combustion engines comprising mineral lubricating oil of high viscosity index containing a minor proportion of esters of lower aliphatic alcohols from synthetic acids produced by the oxidation of paraffin wax, and a minor proportion of the calcium soap of phosphonic acid prepared from high viscosity index mineral lubricating oils.

2,295,081

DIESEL ENGINE INJECTOR

Albert S. Harvath, Lansing, Mich.

Application December 10, 1940, Serial No. 369,489
1 Claim. (Cl. 299—107.5)



In an oil injector of the character described, in combination with an engine cylinder, a guiding tube in the head of the cylinder, a spring controlled plunger movable reciprocally in the tube, said plunger having an axial bore, upper and lower perforations communicating with said bore of the plunger, devices having inlet passages for serving oil to the tube and upper perforations of the plunger, said plunger having a valve head on its lower end closing the guiding tube on the upward movement of the plunger, a cap extending above said tube, a rotative block in the cap constructed with spiral grooves and attached to the upper end of the plunger, and bolts in the cap engaging the grooves in the cap whereby the plunger is rotatively moved during its up and down movements.

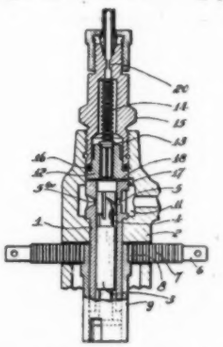
2,301,464

FUEL INJECTION PUMP FOR DIESEL TYPE ENGINES

Paul H. Schweitzer, State College, Pa., assignor to The Pennsylvania Research Corporation, State College, Pa., a corporation of Pennsylvania

Application November 9, 1940, Serial No. 365,125
6 Claims. (Cl. 103—41)

1. A port-controlled injection pump for internal combustion engines of the Diesel type, comprising in combination a barrel provided with a port communicating with a source of fuel supply and with a discharge passage, a valve controlling flow of fuel through the discharge passage, and a fuel feeding plunger reciprocable in said barrel, the barrel being provided with a mechanically-controlled spill passage and also with a leakage escape passage having its inlet positioned between said valve and plunger and being in communication with the source of fuel supply, flow of fuel through said leakage escape passage being effected and controlled solely by the pressure applied to the fuel by the pump.



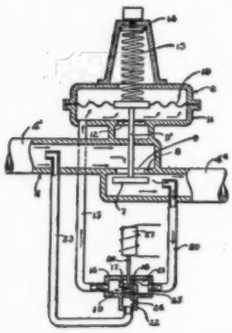
2,294,152

GAS ENGINE SHUTDOWN DEVICE

James L. Yates, Kenmore, and Harry P. Yount, Buffalo, N. Y., assignors to Worthington Pump and Machinery Corporation, Harrison, N. J., a corporation of Delaware.

Application August 5, 1939, Serial No. 288,536

6 Claims. (Cl. 123—198)



1. In combination with an internal combustion engine utilizing gas under pressure as fuel and having a gas supply line to the engine, of a valve interposed in said gas supply line for controlling the supply of gas to the engine, pressure actuated means for operating said valve, a gas by-pass for delivering gas under pressure to said pressure actuated means and being open to the low pressure side of the gas supply line during normal operation of the engine whereby said pressure actuated means will be under action of the low pressure gas, and means interposed in said by-pass and operable upon abnormal conditions detrimental to engine operation to close said by-pass to the low pressure side of the gas line and open it to the high pressure side of the gas line to permit passage of gas to the pressure actuated means for actuating the pressure actuated means to cut off the delivery of gas to the engine.

2,302,358

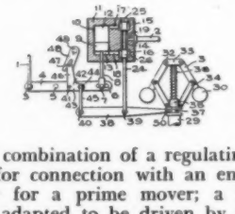
REGULATING DEVICE FOR FUEL INJECTION APPARATUS

Hesper von Tavel, Geneva, Switzerland

Application September 18, 1941, Serial No. 411,397

In Switzerland September 23, 1940

4 Claims. (Cl. 121—42)

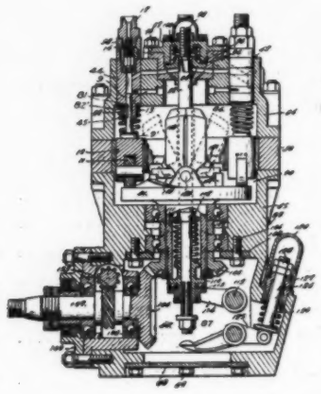


1. The combination of a regulating member adapted for connection with an energy input controller for a prime mover; a centrifugal governor adapted to be driven by said prime mover; a servomotor connected to actuate said regulating member and including a distributing valve which controls the motion of the servomotor; a floating control lever connected with said distributing valve and with said governor; a motion combining element hinged to said regulating member and connected with said control lever; and an angularly adjustable guide determining the direction of motion of a portion of said motion combining element, said motion combining element and the control lever together comprising a follow-up mechanism between the servomotor and its value under control of the governor, and the angular adjustment of said guide serving to vary the positional relation between the regulating member and the governor and also the motion ratio between the servomotor and its distributing valve.

ADVERTISERS' INDEX

2,300,313
FUEL INJECTION PUMP FOR INTERNAL COMBUSTION ENGINES

Byron R. Pool, Mount Carmel, Ill., assignor to Theodore K. Coleman, Mount Carmel, Ill.
Application July 26, 1938, Serial No. 221,405
6 Claims. (Cl. 103—173)



6. A fuel injection pump for an internal combustion engine comprising a plurality of individual fuel injection units, means to supply fuel to each of said units leading from a fuel supply chamber, means connected to said units to discharge fuel therefrom, and means separate from said fuel supply means connected to each of said fuel injection units to determine the quantity of fuel delivered from said fuel discharge means comprising a conduit, and a rotary valve in said conduit, said valve being adjustable to vary the period of closure of said conduit during a complete cycle of said pump for each of said fuel injection units, and adjustable stops to limit the movement of said valve member for both maximum and minimum fuel delivery.